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FINAL REPORT
TASK ES-8-22
COMPUTERIZED APPLICATION OF STANDARDS
NEWPORT NEWS SHIPBUILDING
January 9, 1985

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January 9, 1985

Transportation
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NSRP 0212
NSPP-SPC-SP6

COMPUTERIZED APPLICATION OF STANDARDS

FINAL REPORT ON TASK ES-8-22

9 JANUARY, 1985

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Prepared By

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

For The

NATIONAL SHIPBUILDING RESEARCH PROGRAM

In Conjunction With

Panel SP-8 on Industrial Engineering

of the

Society of Naval Architects and Marine Engineers

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EXECUTIVE SUMMARY

The Computerized Application of Standards Project successfully proved that MOST developed standards could be applied by an existing computer-aided design system to eliminate manual application of standards. The Computer Center, Industrial Engineering, and Production Engineering worked together to develop a computer program to apply standards to the pipe detail work packages for the bending, fabricating, welding, and machining operations in the pipe shops.

The implementation of this program into the computer-aided pipe detail design systems has resulted in improved accuracy and consistency of standards applications. Other benefits resulting from computerized application of standards include: increased manhour productivity, standardization of pipe detail part terms, capability to apply detailed standards, and the capability for computerized transfer to the Production Scheduling and Control System.

The development of the program took approximately eight months and involved extensive communications between the computer programmer and the Production Engineering pipe shop planners. This level of effort was based on the existence of a computer-aided pipe design system Generating pipe detail work packages and a well-established manual standards application system. Although the transferability of the program software may be minimal, the approach and techniques used to develop the program should be highly transferable.

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INTRODUCTION

The Computerized Application of Standards Project provided for the elimination of manual application of standards by integrating standards that were previously developed using Manual MOST into existing Newport News Shipbuilding production computer systems. The pipe shop Work Management Manuals were developed between 1978 and 1979 using 10X Manual MOST. Since 1979, the Work Management Manuals, along with information obtained from existing production computer systems, have been utilized by Production Engineering personnel to manually apply standards to pipe shop work packages for bending, fabrication, welding and machining operations. The work packages are part of a production control system used to schedule and track the progress of pipe details through each shop work center.

The pipe shops at Newport News Shipbuilding are divided into three areas; Steel Pipe Shop, Copper Pipe Shop, and Nuclear Pipe Shop. This project provided for computerized application of standards to work packages for all three shops. Since the application-procedure is identical for all three shops, only the Steel Pipe Shop is explained in detail in this report. This will simplify the report by avoiding repetitious documentation.

The pipe shops were selected for this project because of the excellent computer information that was available; the costs to apply standards to the pipe details being generzted; and a well established manual application system was already in existance.

PROJECT SUMMARY

Existing System

The existing manual standards application program for the pipe shops involved interfaces between the Newport News Shipbuilding computer system, production engineering shop planners, and shop foremen. The standards were applied to pipe details by Production Engineering and then organized into work packages for use by the shop foremen.

The pipe details were created from piping design drawings by a computer-aided pipe detail manufacturing system. Two sheets were generated for each detail: a pipe detail manufacturing record and a working drawing of the pipe detail (Fig. 2).^{*} The pipe detail manufacturing record provides the following data:

- how the pipe is bent: number of bends
bend radius
bend angle
- layout of pipe detail: distance between center
distance between tangents
X, Y, Z coordinates
- how the pipe is fabricated
- end preparation required for welding
- size and description of pipe and fittings
- material type and part number of pipe and fittings
- miscellaneous fabrication notes

The working drawing provides dimensioned views and an isometric sketch of the pipe detail.

^{*} There is no Figure 1.

ID	PIECE NO	LOCATION	ORIENT	JT	Y JOINT NO.	NDT
1	P146-1	MAIN PIECE				
2	F2	B END1	90.0-Z	BP		VT
3	P91-1	WITH A F2		BP		VT
4	P91-2	WITH C F2		BP		VT
5	F18	B WITH P91-1	15-Z	BP		VT
6	FL1	A WITH P91-2	90.0+X	BP		VT
7	F5	B WITH A F18		BP		VT

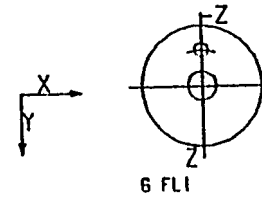
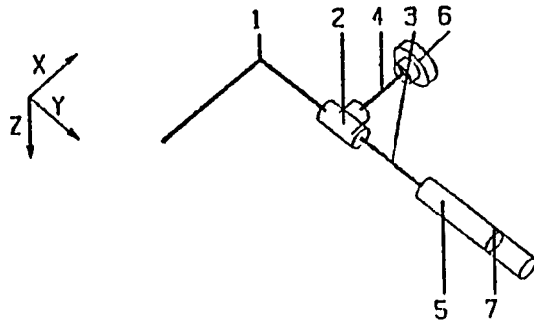
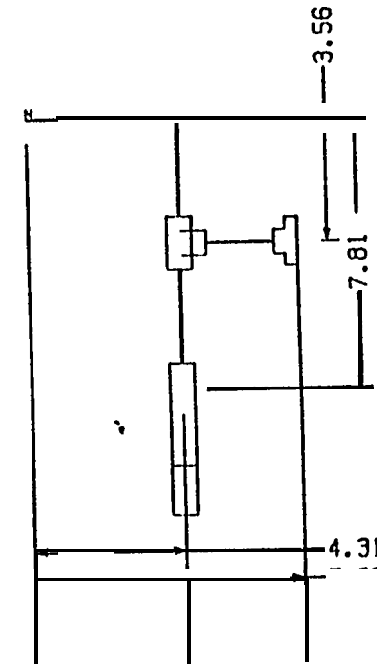


Fig. 2



DATE-
SIGNATURE-
LOCATION-

P91-1	DETAIL	FIG	PAGE	2	OF	2
	ARR. DWG. NO.	2282	-	299X1		
	DET. DWG. NO.	J2282	-	150		

After the pipe details were generated, they were sent from the computer center to the production engineering shop planners. The planners manually applied standards for bending, fabrication, welding and machining to the pipe details. These standards were developed using 10X MOST and were organized on a pick sheet for the planner's use (Fig. 3). The planners used the pick sheets, along with the information generated on the pipe detail manufacturing records, to set the standards for each pipe detail. Work package folders were then established for each pipe detail. Each work package folder included: the pipe detail manufacturing record, the working drawing of the pipe detail, the standard hours for bending, fabrication, welding and machining operations, the parts list, and the material schedule. The material and scheduling information from the pipe "detail manufacturing records and the, standard times for each work center in each pipe detail are transferred to the production scheduling and control system by the planners. The work package folders were sent from the planners to the shop foremen who assigned them to the mechanic as the work arrived at the shop.

This project eliminated. the manual application of standards to the pipe detail. The standards for each detail are now generated by a computer program that interacts with the computer-aided pipe detail manufacturing system. However, the basic flow of the work packages remained unchanged, since the planners are still required to develop the work package folders. Application of the work packages and the use of the standards by the Production Central System are not within the scope of this project and therefore are not addressed.

Bending

Normal Pipe Size	Number of Bends				
	1	2	3	4	5
Applies To All Bending Machines					
1/2" Thru 3 1/2"	1	1	1	1	1
4" Thru 6"	1	1	1	1	1
8" Thru 12" +	1	1	1	1	1

MACHINIS
PER PIPE END)
1 Man Operation

Nos. Straight Combination
Pipe Bevel J Bevel &
Size Operation Counter Bore

1/2" - 1"	1	1
1 1/2" - 4"	1	1
5" - 8"	1	1
10" - 14"	1	1
16" - 20"	1	1

DRILL HOLES: 1 MHRS/HOLE

WELDING

Joint Dia. or No. Pipe Size	Socket Weld				Finange				Butt Weld				Boss	
	Carbon Steel		CUNI, Cres		Chromo- Moly		Carbon Steel		CUNI, Cres		Chromo- Moly			
	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on
1/2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3/4"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/4"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 1/2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 1/2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4 1/2"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20"	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24"	1	1	1	1	1	1	1	1	1	1	1	1	1	1

FABRICATION

A Pipe or Fitting Diam.	B Set-Up The Job	C Fittings	D Slip on Flange	E Special Fittings				F Brazing		G Template Set-Up	H Assemble Flange To Flange
				Branch	Boss	Weld-on-let	Sleeve	Fitting	Flange		
1/2" Thru 3"	1	1	1	1	1	1	1	1	1	1	1
3 1/2" Thru 5"	1	1	1	1	1	1	1	1	1	1	1
5 1/2" Thru 8"	1	1	1	1	1	1	1	1	1	1	1
8 1/2" Thru 12"	1	1	1	1	1	1	1	1	1	1	1
12 1/2" Thru 16"	1	1	1	1	1	1	1	1	1	1	1
16 1/2" Thru 20"	1	1	1	1	1	1	1	1	1	1	1
20 1/2" Thru 24 1/2"	1	1	1	1	1	1	1	1	1	1	1

Fig. 3

Data Development

Before a computerized system to apply the standards could be developed, the input data had to be standardized. The information on the pipe detail manufacturing record is referenced from a catalog of Pipe detail parts. This catalog originally contained the part numbers, material types, and descriptions of the pipe detail parts. For the computer program to apply the correct standards to a pipe detail, it had to be able to use this information to identify the parts. However, the information contained in the parts description was not standardized; different abbreviations were used for the same part, the placement of the part name varied in the description field, many parts names were similar (reducer, reducing flange, reducing elbow) therefore not easily identifiable, etc. Without standardization of the description, it was not possible for the computer to accurately identify the parts. To provide for standardization of the catalog's part descriptions, the size of the catalog record was increased to include a type code.

The type code consists of three letters used to identify the piece type, weld joint type, and additional description of the piece (Fig. 4). The type code allows the part to be easily identified regardless of how it is abbreviated within the description on the pipe detail manufacturing record. Type codes were identified for all parts already in the catalog and are assigned as new parts are entered into the catalog.

2

THERE ARE 3 LETTERS TO THE TYPE CODE. THE FIRST LETTER IDENTIFIES THE TYPE OF PIECE, AND IS LISTED ALPHABETICALLY. THE SECOND LETTER GIVES THE WELD TYPE. SINCE THE WELD TYPES DO NOT SPECIFICALLY MODIFY ANY ONE PIECE TYPE, THEY ARE LISTED AS A GROUP FIRST. THE THIRD LETTER IS USED TO DESCRIBE THE PIECE. SINCE REDUCING AND UNION ARE GENERAL PURPOSE MODIFIERS, THEY ARE LISTED FIRST. THE REMAINING MODIFIERS ARE LISTED ON THE LINE OF THE PIECE THEY MOST FREQUENTLY DESCRIBE.

PIECE TYPE CODES

1ST LETTER	2ND LETTER	3RD LETTER
<u>PIECE TYPE</u>	<u>JOINT TYPE</u>	<u>MODIFIER</u>
A = ADAPTOR	B = BUTT WELD	R = REDUCING
B = BOSS	F = FLANGED	U = UNION
C = COUPLING	S = SOCKETT WELD	
	T = THREADED	
	Z = SIL-BRAZED	
	M = MIXED	
	N = N/A	
E = ELBOW		9 = 90 DEG RADIO
F = FLANGE		4 = 45 DEG RADIO
		D = RAISED FACE
		F = FLATFACE
		O = SLIP UN
		T = FOUNDATION
H = BUSHING		I = CONCENTRIC
N = NIPPLE		E = ECCENTRIC
P = PIPE		
R = REDUCER		
S = SLEEVE		
T = TEE		
U = UNION		
V = VALVE		
		M = MALE
		W = FEMALE
		A = ANGLE
		B = BALL
		C = CHECK
		G = GATE
		i = ELCO.
= WELDOLET, SOCKLET,		
BRAZOLET, . . .		
X = CROSS		P = P TRAP
Y = LATERAL		S = S TRAP
Z = TRAPS		N = RUNNING TRA'
		1 = 1 NODE
		Z = Z NODE
		3 = 3 NODE
M = MISC		

Fig. 4

Program Development

The computer program that applies the standards to the pipe details is a part of the computer-aided pipe detail manufacturing system. The flowchart and program for the Steel Pipe Shop are included in the Appendix. Data in the program has been modified to exclude company proprietary information. The program is divided into four major sections (bending, fabrication, welding, machining), which are part of the following format:

- a pipe detail is selected from the computer-aided pipe detail manufacturing program. (A detail may be a single piece of pipe or may include a main pipe piece with up to 25 fittings.)
- all data needed to apply pipe standards is collected from the pipe detail manufacturing system
- the bending standard times are extracted from the standards table
- the fabrication standard times are extracted from the standards table
- the welding standard times are extracted from the standards table
- the machining standard times are extracted from the standards table
- the standard time values for the pipe detail are printed

Bending Values Development

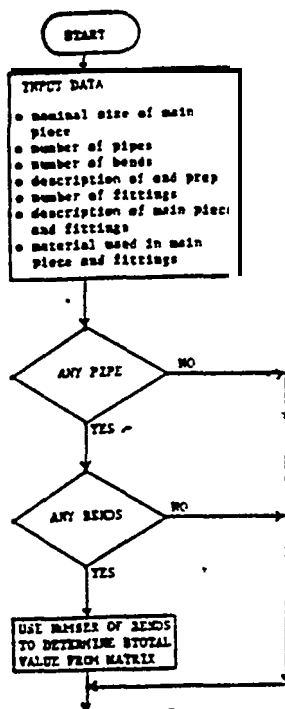


Fig. 5

Bending					
Nominal Pipe Size	Number of Bends				
	1	2	3	4	5
<u>Applies To All Bending Machines</u>					
1/2" Thru 3 1/2"	1	1	1	1	1
4" Thru 6"	1	1	1	1	1
8" Thru 12" +	1	1	1	1	1

Fig. 6

Data from the pipe detail manufacturing system is used to determine number of bends and the main pipe piece size. The standard times for Bending are established in a matrix (Fig. 6) which is identical to the matrix on the planner's pick sheet. The outside diameter of the main pipe piece determines which row is applicable and the number of bends required determines the applicable column. The program accesses the standard time and records the total bending value for the detail.

Fabrication Values Development

Fitting information is collected and organized before the Fabrication, Welding, and Machining values are calculated. Fitting data, including the description, material type, and end preparation, is taken from the computer-aided pipe detail manufacturing system where it has already been used to develop the pipe detail manufacturing record. If the pipe detail is bent but has no fittings the program advances to the point immediately following the **determination of the welding values (A)**. If the pipe detail has fittings, the fabrication and welding values are determined.

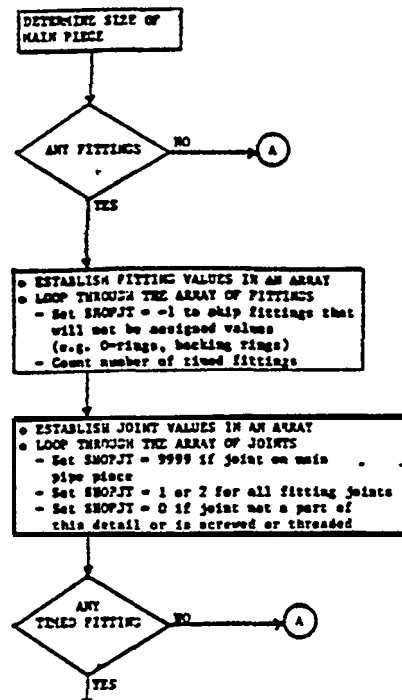


Fig. 7

The input data is reviewed and the fittings are established in an array. Fittings that are designated as having no value (e.g. O-rings, backing rings, etc.) are flagged so they will be excluded from consideration in the

remainder of the program. These excluded fittings will be specific to each shipyard depending on the application of their work packages. The number of remaining fittings is then determined by subtracting the number of excluded fittings from the total number of fittings.

After the fitting array is set up, another array containing the information pertaining to the joints (including end preparation) is established. A direct correspondence exists between these arrays. The array of joint sizes allows the program to correctly handle a number of special situations. These situations may exist for reducing fittings, which can be different sizes on each end, and for bosses, branches, or weld-on-lets which may differ in size from the piece to which they are attached. Joints that are screwed or threaded are designated as having no value and are flagged so they will be excluded from consideration in the program. A loop is made through the array to identify excluded joints, joints on the main pipe piece, and fitting joints.

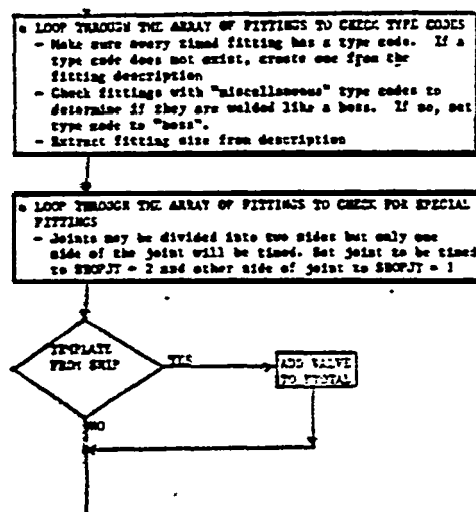


Fig. 8

The next step is to loop through fitting array to check for type codes. Using the descriptions of the fittings in the array the type codes are extracted from the catalog of pipe detail parts. If the fitting type code is not in the catalog, the fitting description is scanned and the type code created.

Another loop is made through the array of fittings to determine how the standards for joints at special fittings will be applied. Each joint is divided into two sides, based on fitting descriptions and size information generated by computer-aided pipe detail manufacturing systems. Each side of the joint is analyzed to determine which side will be used to determine the standard.

In a separate routine, the notes from the pipe detail manufacturing record are scanned to determine if the detail has a "Template From Ship" note. This note requires that a template be taken from the ship in order to construct the pipe detail. This operation requires that an additional value based on the outside diameter of the main pipe piece be added to the fabrication total.

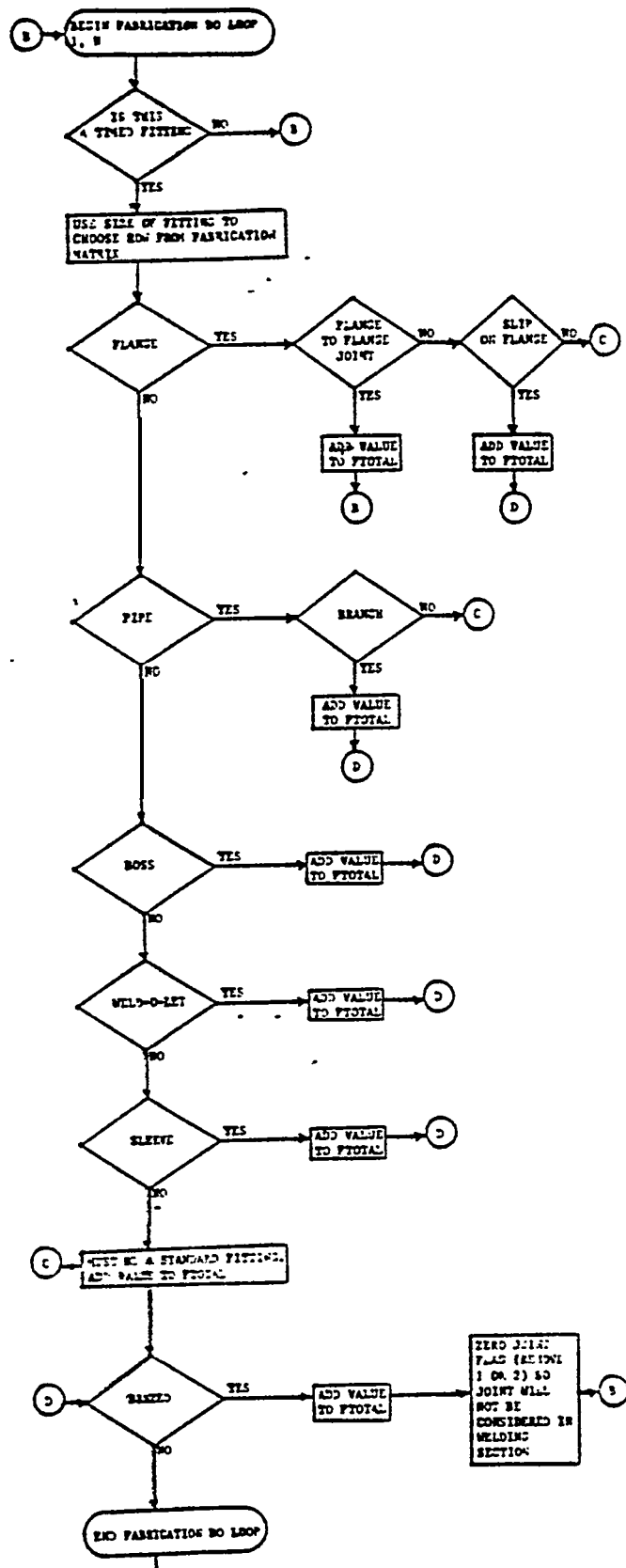


Fig. 9

The fitting outside diameter, description, end preparation, and type code are used to determine the fabrication values from the matrix (Fig. 10). The outside diameter of the fitting determines which row of the matrix is applicable for an operation. Each column is checked until the correct fitting type is found. All the fittings for the detail are looped through and the standard time for each fabrication-activity is added to the overall detail fabrication total.

FABRICATION

A	B	C	D	E				F		G	H
Pipe or Fitting Diam.	Set-Up The Job	Fittings	Slip on Flange	Special Fittings				Brazing		Template Set-Up	Assess Plan Plan
				Branch	Boss	Weld-o-let	Sleeve	Fitting	Flange		
1/2" Thru 3"	1	1	1	1	1	1	1	1	1	1	1
3 1/2" Thru 5"	1	1	1	1	1	1	1	1	1	1	1
5 1/2" Thru 8"	1	1	1	1	1	1	1	1	1	1	1
8 1/2" Thru 12"	1	1	1	1	1	1	1	1	1	1	1
12 1/2" Thru 16"	1	1	1	1	1	1	1	1	1	1	1
16 1/2" Thru 20"	1	1	1	1	1	1	1	1	1	1	1
20 1/2" Thru 24 1/2"	1	1	1	1	1	1	1	1	1	1	1

Fig. 10

The pipe shop specifications require that brazing be included in the fabrication step. The end preparation required for each fitting is checked to determine if brazing is required. If the fitting is brazed, the joint flag is removed so the joint will not be considered in the welding section of the program. The brazing standard times are added to the fabrication total for each detail.

Welding Values Development

The welding values are determined joint by joint, they are not looped through an array like the fabrication values. The outside diameter of the piece at the joint determines which row of the matrix (Fig. 13) is applicable for an operation. Before the welding values are determined, flags are set to keep track of the first weld of each weld type. This is necessary because the first joint requires preparation and set-up time.

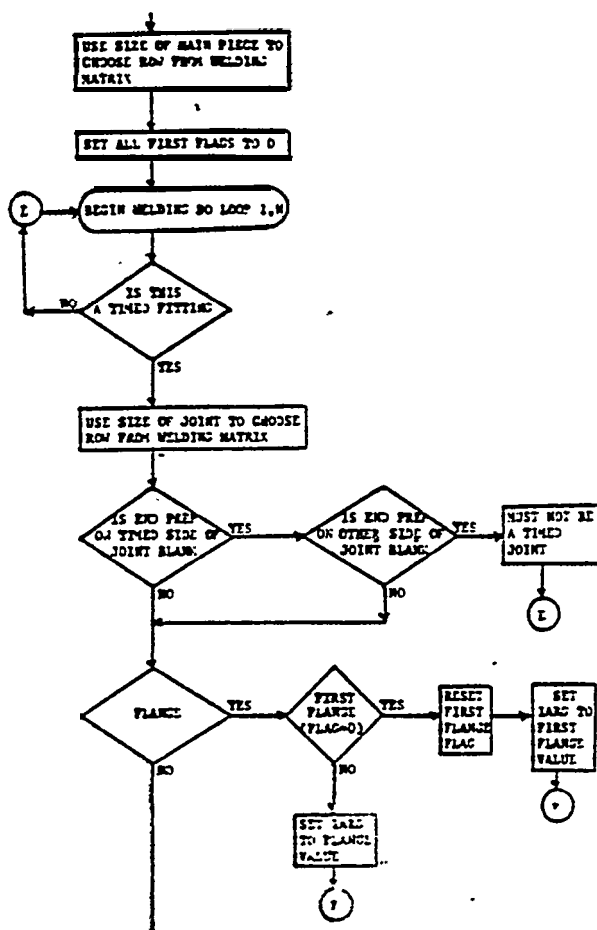


Fig. 11

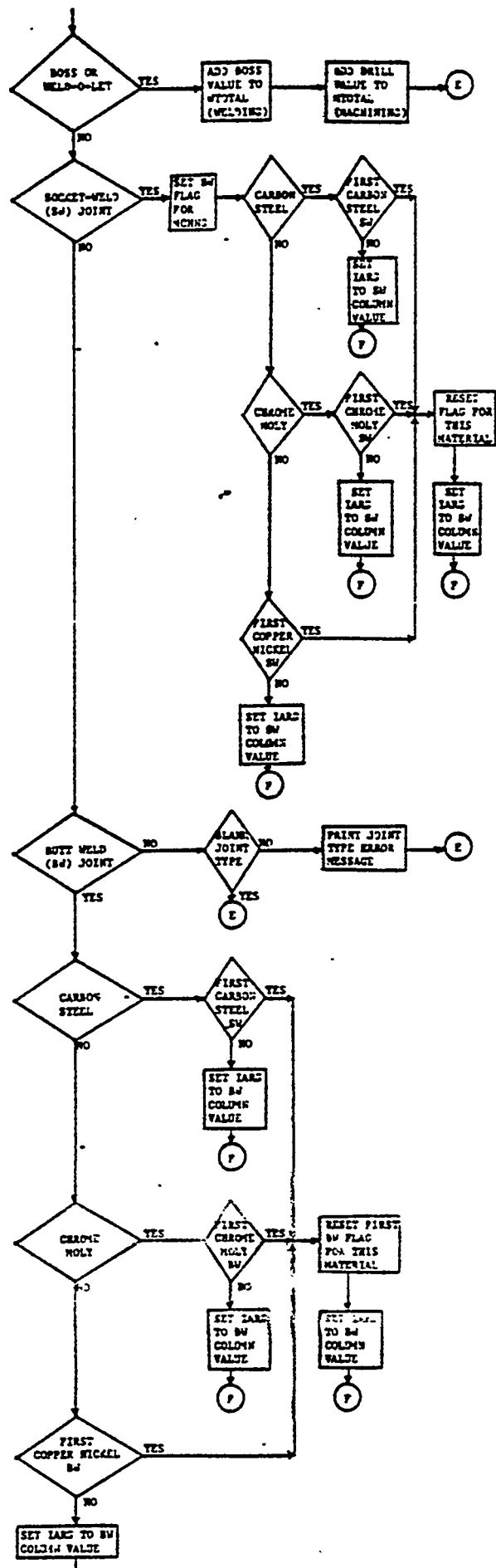


Fig. 12

The end preparation requirements are checked to make sure that the fitting requires welding and to determine the joint type. The type of fitting is checked to determine the column section of the matrix (Fig. 13). If the fitting is a boss or flange the standard time from the matrix is selected according to size, regardless of the joint type. Other fittings are selected according to the joint type and material type. The standard time for each joint is determined and the welding value for the detail is incremented joint by joint.

Joint Dia. or Nom. Pipe Size	Socket Weld						Flange		Butt Weld						Boss	
	Carbon Steel		CUNI, Cres		Chrome-Moly				Carbon Steel		CUNI, Cres		Chrome-Moly			
	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Flange	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on	First Joint	Each Add-on
1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3/4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Fig. 13

Machining Values Development

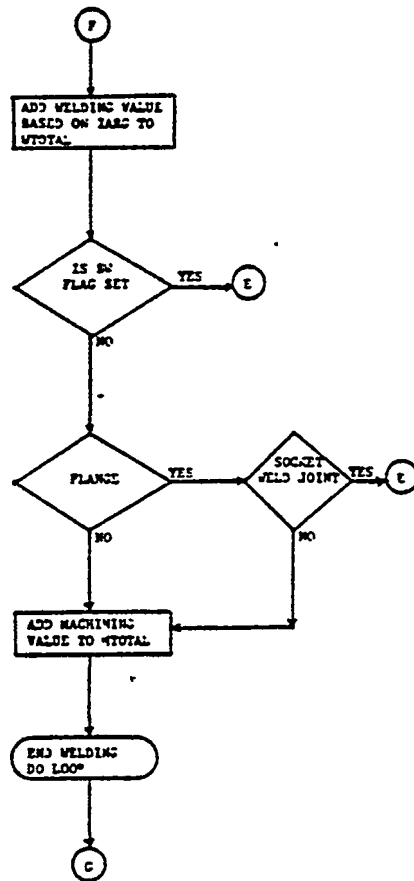


Fig. 14

MACHINING
PER OIOE END
1 Man Operation

Nos. Pipe Size	Straight Bevel Operation	Combination J Bevel & Counter Bore
1/2" - 1"	1	---
1 1/2" - 4"	1	1
5" - 8"	1	1
10" - 14"	1	1
15" - 20"	1	1

DRILL HOLES: 1 MHRS/HOLE

Fig. 15

The machining values are based on the type of welding involved and the end preparation required for a piece. Since machining is directly related to welding it is included within the welding section of the program but is considered a separate operation for standards application.

The machining required for each joint is based on the fitting type and the welding involved. If the fitting is a flange, it must be determined whether a butt weld or a socket weld is required. If a socket weld is required for a flange end prep, no machining value is applied. If a butt weld is required for a flange end prep, the machining value is applied. If the fitting is a boss, the drilling value is added to the machining value directly after the welding value for bosses is added to the welding total.

The machining values for the other joints are based on the type of welding required. If a socket weld is required, no machining values are applied. If a butt weld is required, the machining value is for the time spent to bevel the end of the pipe prior to welding. Therefore, a machining value is not applied if the joint is a fitting to fitting joint.

The outside diameter of the-piece determines which row of the matrix (Fig. 15) is applicable for an operation. The column is determined by the type of machining operation required for particular weld types. According to Newport News Shipbuilding specifications, the Combination J Bevel & Counter Bore is used only on one particular weld type, all other operations use Straight Bevels. The machining values for each operation are determined and added to the machining total.

Pipe Details Without Fittings

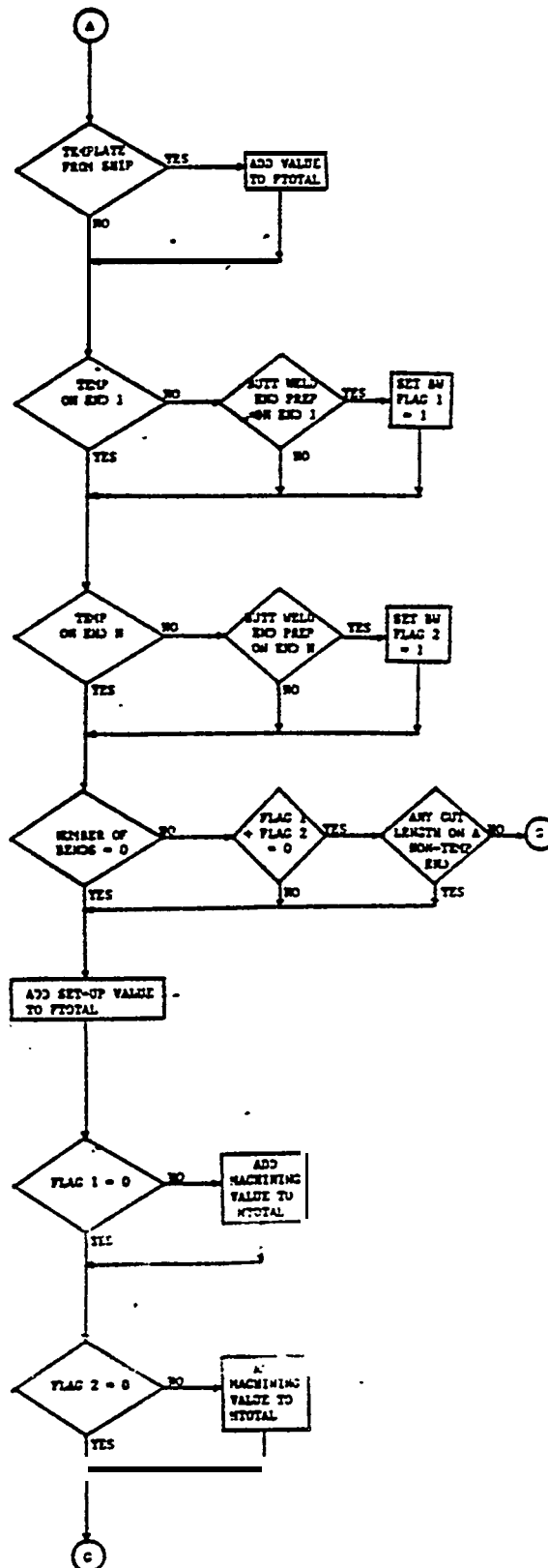


Fig. 16

Before the value totals are printed, the pipe details without fittings are checked for fabrication requirements. If a "Template From Ship" is required, the value for additional set-up time is designated as part of the fabrication value.

Next, the end preparation-requirements are checked to determine if a templated end is left on either end of the main pipe piece. This templated end consists of additional length at the end of the piece of pipe that can be cut to fit the work already installed on the ship. If there is a templated end, then that end of the pipe is not prepared and a machining value is not applied. If there is not a templated end, then either one or both ends of the piece may require butt weld end preparation. If the end preparation is required, flags are set so that machining values will be applied.

If the pipe is bent, the end preparations are checked. If butt weld end preps were not required and a specified cut length on a non templated end was not specified then the program advances to print out the standard values. If butt weld end preps were required then the set-up value is added to the fabrication total and the machining total. If the pipe is not bent, the set-up value is added to the fabrication total and any required machining values are added to the machining total.

Print Out

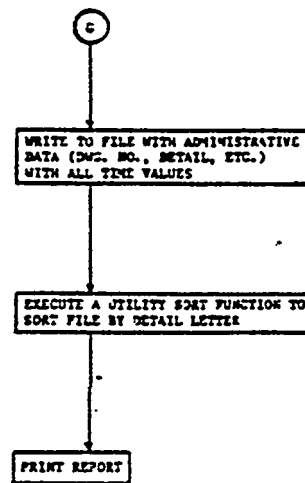


Fig. 17

After the bending, fabrication, welding and machining values are determined, the total value for each operation on a detail is written to a file. This record also includes administrative data, drawing numbers, and the pipe detail identifier. A utility sort function is performed to sort the file by detail identifier. A print out of the details, with the standard time values, is provided to the planner when developing the work packages (Fig. 18).

DATE 11/12/8

STANDARD TIME VALUES

PAGE 2

DETAILS/REVISION	----	-----BENDING-----	LAY-OUT & CUT-	---MACHINING---	---FABRICATION---	----WELDING----
	-----	---VALUE/SHOP---	---VALUE/SHOP---	---VALUE/SHOP---	---VALUE/SHOP---	---VALUE/SHOP---
					1.3/COPPER	1.7/COPPER
A/C		.3/COPPER			1.8/COPPER	3.1/COPPER
C/C		.3/COPPER			2.1/COPPER	2.0/COPPER
D/C		.3/COPPER			1.9/COPPER	2.8/COPPER
F/C		.4/COPPER		2.0/STEEL	3.1/STEEL	2.4/STEEL
H/C				2.5/STEEL	3.8/STEEL	3.0/STEEL
J/C					1.3/COPPER	2.2/COPPER
R/C		.4/COPPER		2.0/STEEL	3.8/STEEL	2.8/STEEL
S/C					1.8/COPPER	3.1/COPPER
V/C		.3/COPPER		1.0/STEEL	1.7/STEEL	1.2/STEEL
Y/C					1.8/COPPER	2.8/COPPER
AB/C		.4/COPPER		1.4/STEEL	2.8/STEEL	2.0/STEEL
AD/C					2.3/COPPER	4.0/COPPER
AE/C				1.4/STEEL	2.1/STEEL	1.8/STEEL
AF/C					.8/COPPER	.4/COPPER
AH/C		.3/COPPER		.5/STEEL	1.0/STEEL	.4/STEEL
AJ/C				1.5/STEEL	3.1/STEEL	2.8/STEEL
AK/C				1.0/STEEL	2.4/STEEL	2.0/STEEL
AL/C					1.5/COPPER	1.8/COPPER
AS/C					1.5/COPPER	1.3/COPPER
AT/C					1.5/COPPER	1.3/COPPER
AU/C					2.1/COPPER	2.0/COPPER
AV/C					2.1/COPPER	2.0/COPPER
AW/C					.9/COPPER	1.1/COPPER
AY/C					.9/COPPER	1.1/COPPER
AZ/C		.9/COPPER			1.5/COPPER	1.8/COPPER
BE/C						

Fig. 18

HULL APPL.
625 626 627GROUP NO.
2285- 4100-5407-ARRO DWG. 2285 - 105981
DETAIL DWG 12285 - 1090

Testing

After the development of the standards application programs was completed, the programs were tested for completeness and accuracy. Testing was accomplished by comparing the standard time results from the program with those applied manually by the planners. A cross section of drawings were tested in this manner until the results were consistently correct.

When the computer applied standards were compared to the manually applied standards, the computer application proved more accurate in many cases than manual application. The program also identifies input data errors and will not attempt to calculate the standards with incorrect data. A data error message is printed with the pipe detail so data corrections can be made.

After the testing was complete, the program was put into production use. The application of the program and the interfaces with other computer programs were closely monitored for any adverse effects. The planners have been told to notify the computer programmer if any unusual results are received.

BENEFITS

This project successfully proved that MOST developed standards could be applied by an existing computer-aided design system to eliminate the manual application of standards. Computerized application of standards has resulted in improved:

- accuracy
- consistency
- productivity

Preliminary results indicate that the costs for computerized application are approximately equal to the costs for manual application. There are several reasons why both application processes appear to result in equal costs.

- The standards application pick sheets were designed for ease of manual application." The detail of the standards were compromised so they could be categorized for easier application.
- The planners are organized into specialized groups according to the standards application pick sheets. Therefore, over a period of time, each planner becomes highly skilled and proficient in standards application within his areas.
- The computerized application costs are temporarily high since this program was written to be compatible with a new computer system and not most efficient under the existing system. A system changeover is occurring which will reduce costs.

Benefits resulting from the computerized application of standards include:

- Increased manhour productivity
The manual application of standards has been eliminated resulting in additional time for the planners other work. Computer costs do not directly correspond to manhour costs.

Improved accuracy and consistency

The computer is not prone to fatigue and mistakes present in manual application.

- Standardization of pipe detail part terms
The capabilities of the existing computer-aided pipe detail manufacturing system is expanded by being able to accurately identify parts.
- Capability to apply detailed standards
The standards are currently used as targets by the pipe shops. If more detailed standards were required, the matrices on the application pick sheets would be expanded, making it difficult for manual application.
- Capability for computerized transfer to the Production Scheduling and Control System

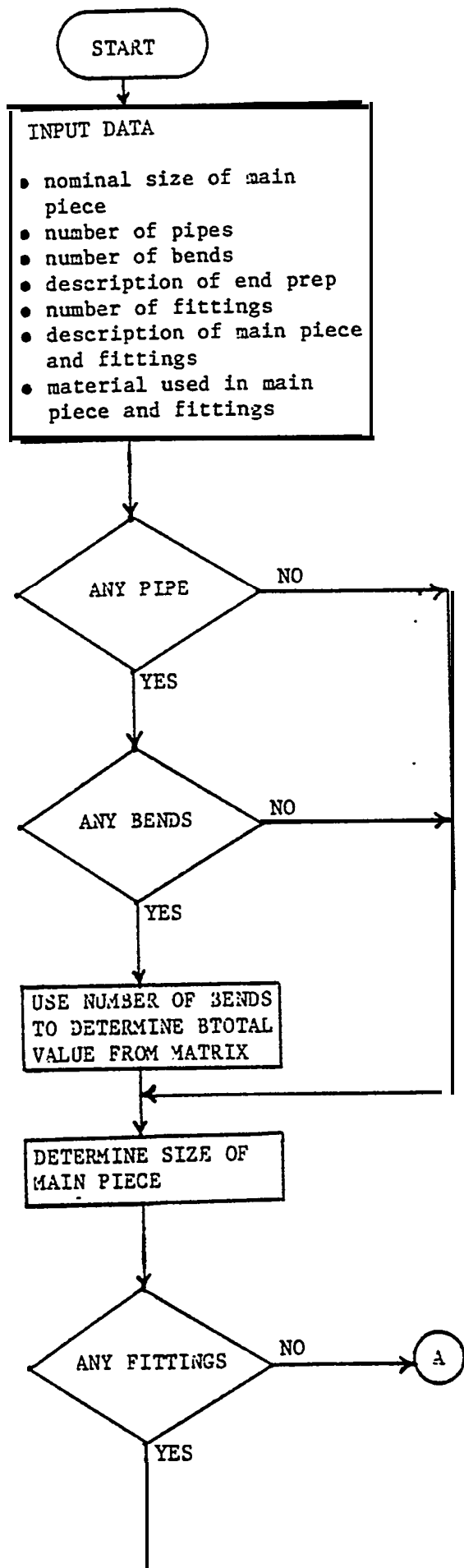
CONCLUSIONS

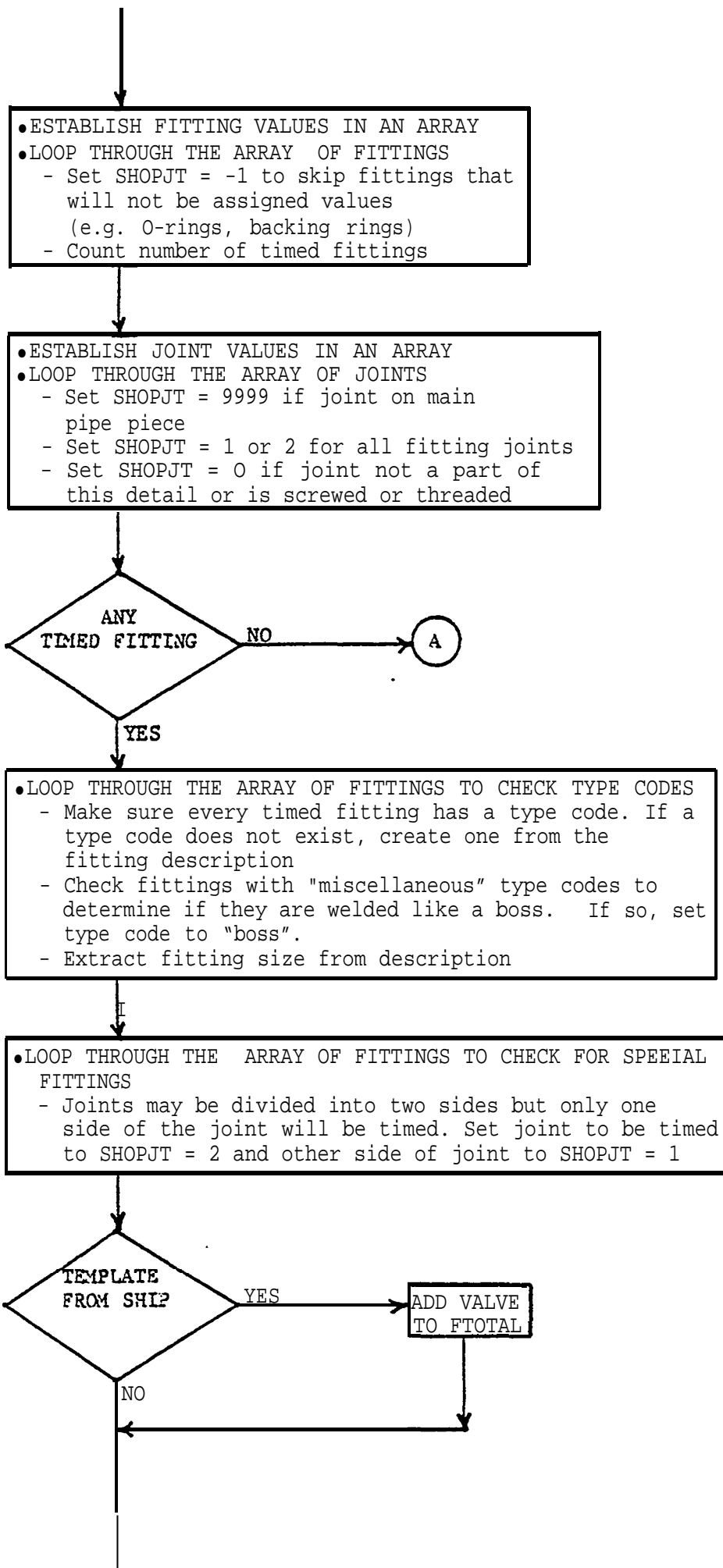
This project successfully proved that MOST developed standards could be applied by an existing computer-aided design system to eliminate manual application of standards. Computerized application of standards proved superior to manual application and particularly beneficial if concerned with accuracy, consistency, and application of detailed standards.

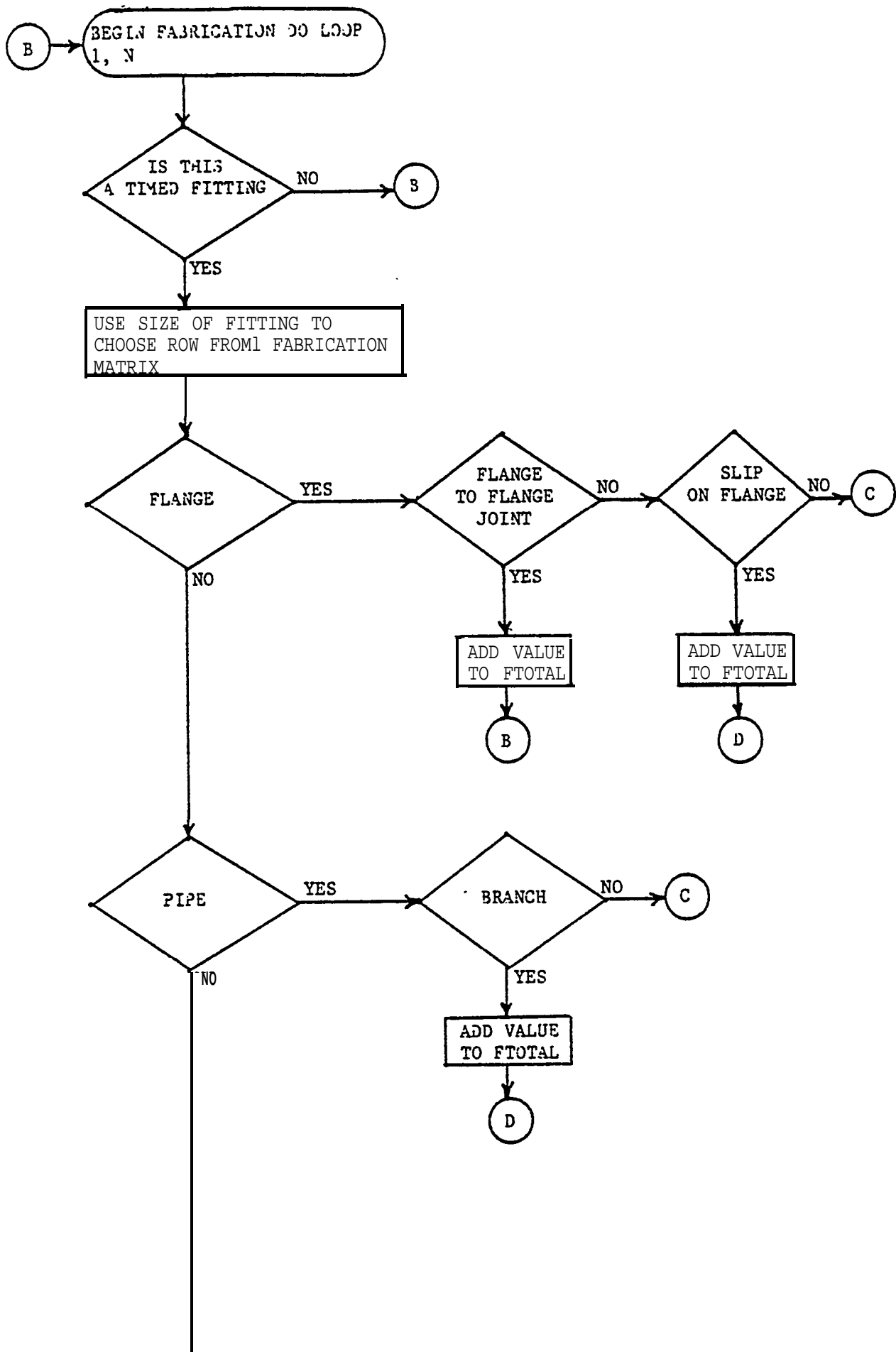
The development and implementation of the program was also beneficial for Newport News Shipbuilding since it forced the standardization and upgrading of input data and other programs within the computer-aided design system.

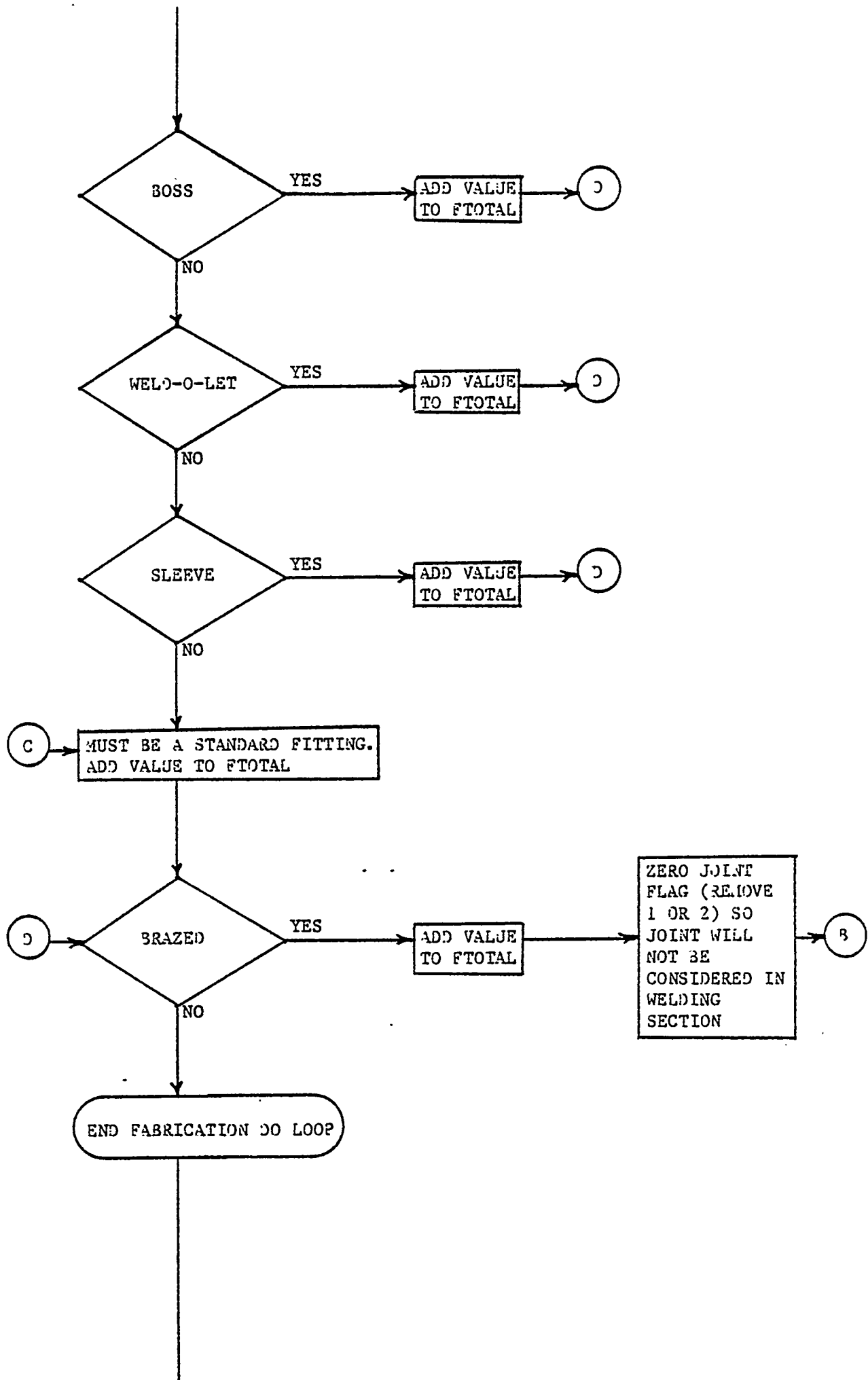
The transferability of this program depends on the computer-aided design systems and standards application processes in use. Due to the company-oriented nature of these systems and processes, the transferability of the actual program software is probably minimal. However, the approach and techniques used to develop this program should be highly transferable. This information should reduce the time and effort required to develop the program.

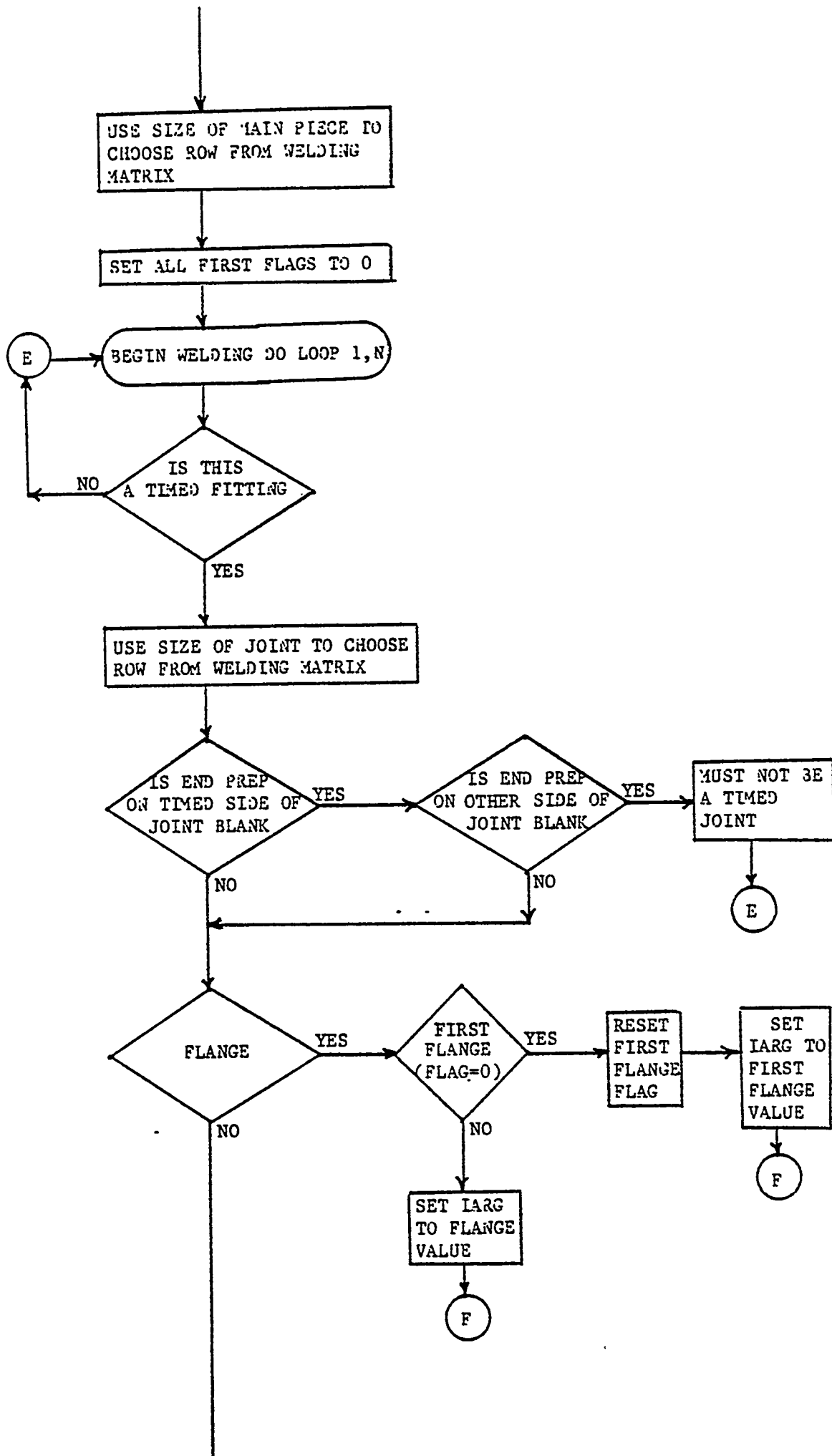
APPENDIX

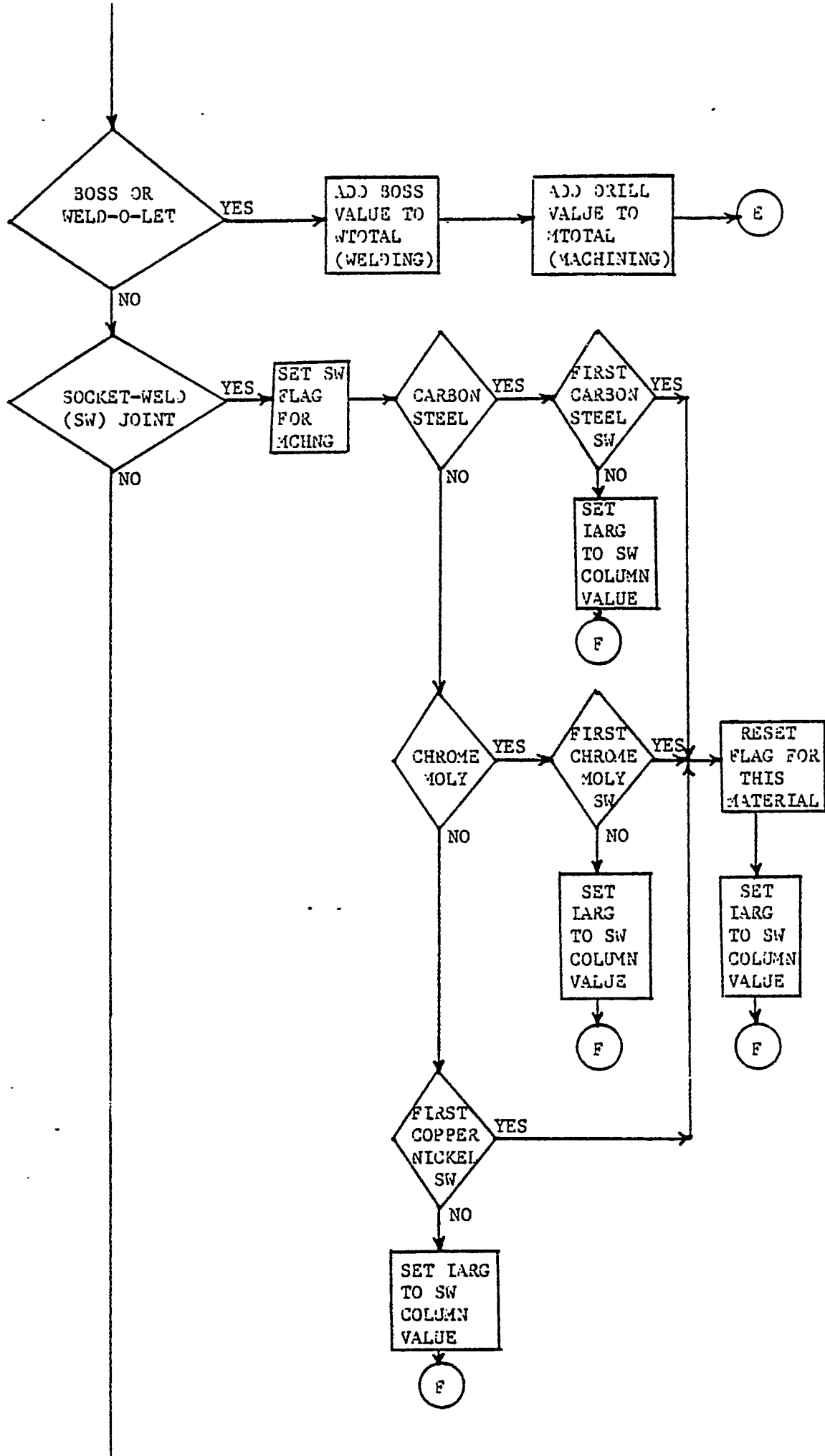


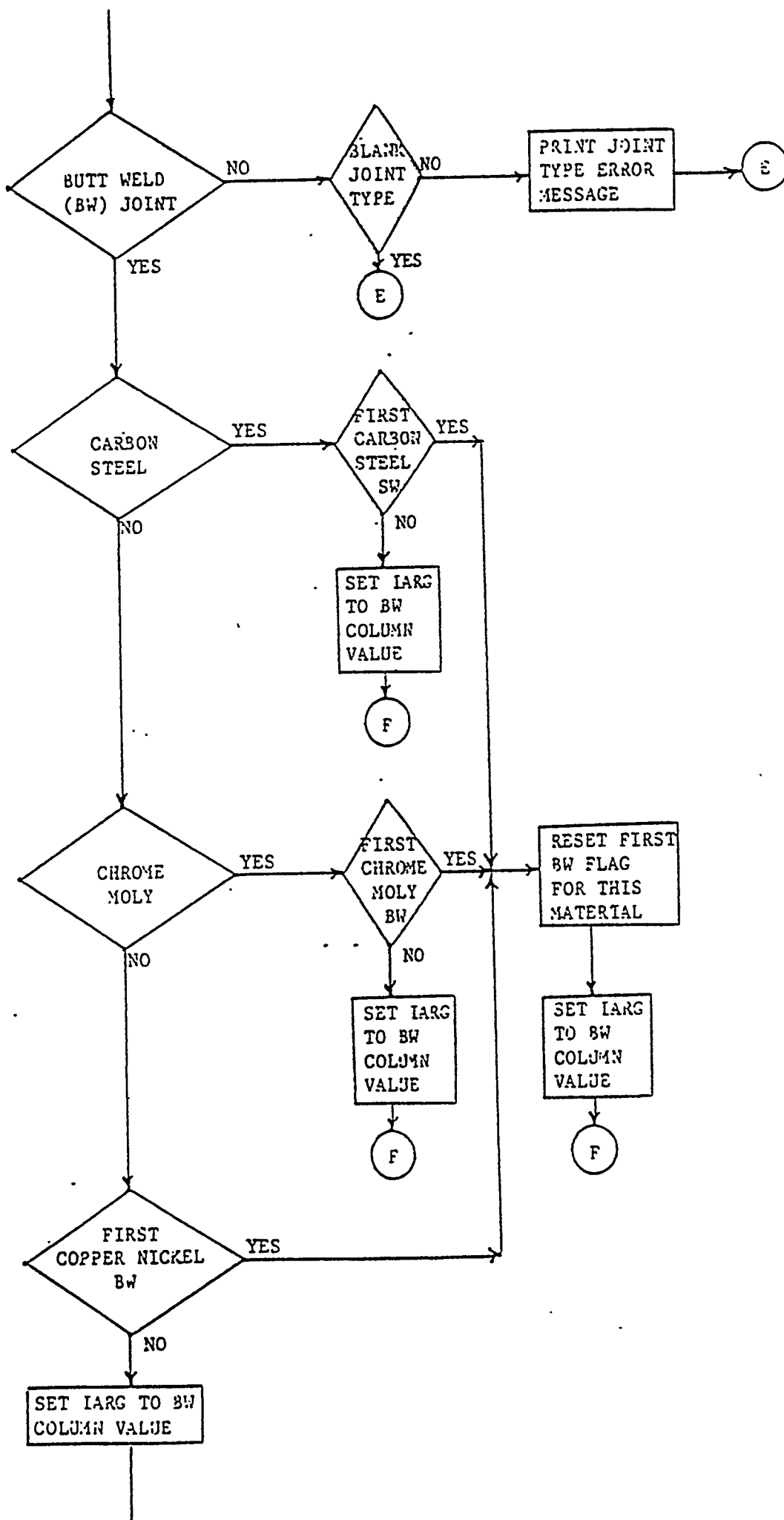


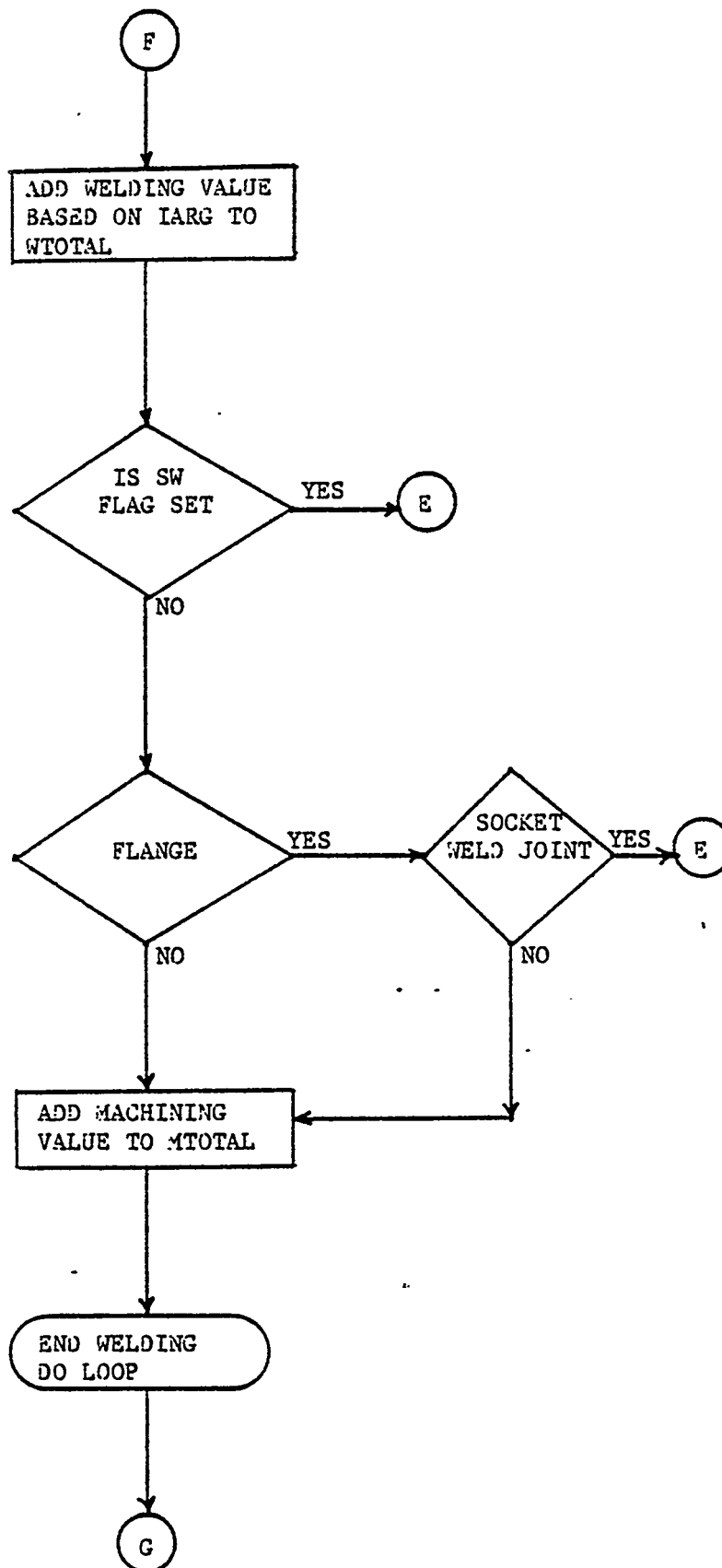


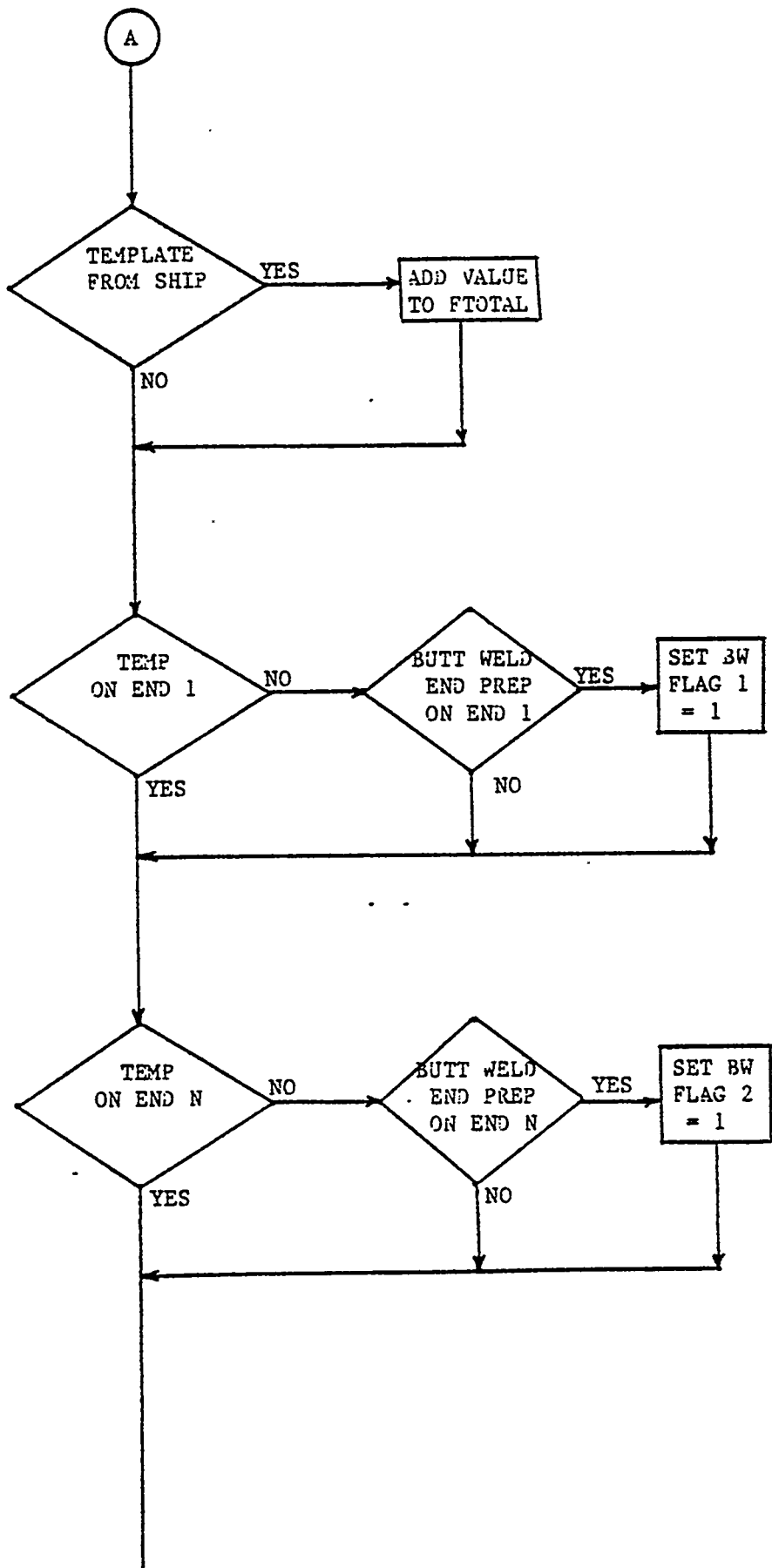


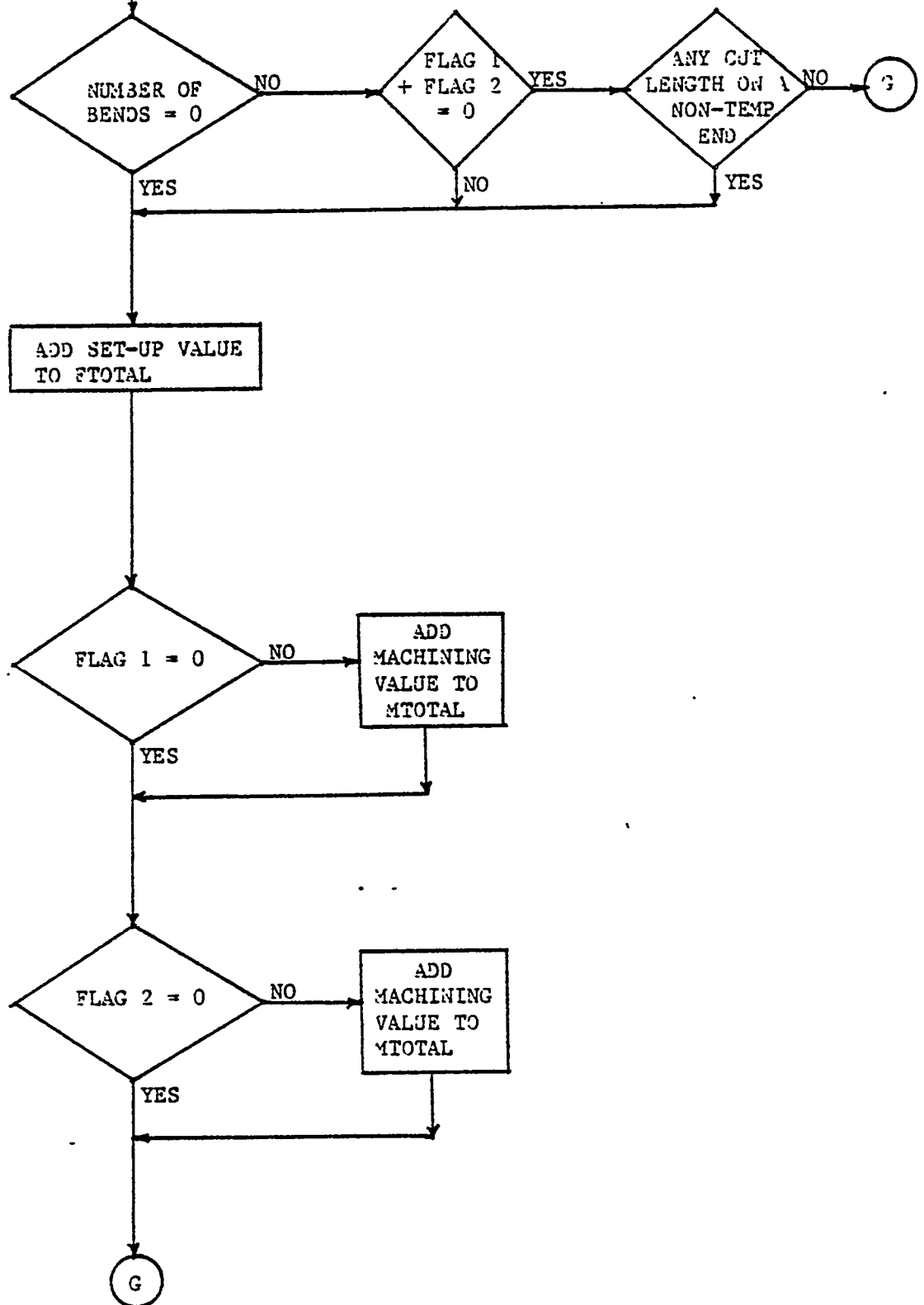












TRANSFERS. . . .

[illegible]

141	.S150	31	35																
173	.S200	36	38																
203	.S250	37	41																
230	.S300	42	50																
256	.S325	53	56																
300	.S400	57	60																
322	.S450	61	64																
344	.S460	65	68																
366	.S470	69	72																
410	.S480	73	76																
432	.S500	77	80																
454	.S550	81	84																
454	.S950	51	85																
461	.S1000	39	89																
507	.S1500	90	92	95															
513	.S1800	33	45	55	59	63	67	71	75	79	83	94	98						
518	.S1900	86	100																
516	.S5000	23	105																
112	.S5100	121	122																
630	.S5200	127	132																
640	.S5300	117	136																
643	.S5500	116	139																
654	.S6000	111	130	134	137	143													
660	.S6200	147	153																
666	.S7000	118	121	140	152														
715	.S8000	155	163																
722	.S9000	157	169																
746	.S9500	149	176																
0	.S9876	177																	

EDIT DATE 06-29-83 < FT2.1U1 >

ELAPSED TIME (SEC) .66 LINES/MINUTE 16268

THERE WERE NO DIAGNOSTICS IN ABOVE COMPILATION
32K WORDS WERE USED FOR THIS COMPILATION

000000	1	C	SUBROUTINE OD2IPS(OD, IPS)---STA25PI---USE OD TO FIND IPS		00013750
000007	2		SUBROUTINE OD2IPS(OD, IPS)		00013760
000007	3	C			00013770
000007	4		REAL IPS, ABSVAL, OD, ODIPS(2, 25)		00013780
000007	5	C			00013790
000007	6		DATA ODIPS/		00013800
000007	7	C	OD	IPS	00013810
000007	8		&	0.675, 0.375,	00013820
000007	9		&	0.840, 0.500,	00013830
000007	10		&	1.050, 0.750,	00013840
000007	11		&	1.125, 1.000,	00013850
000007	12		&	1.315, 1.000,	00013860
000007	13		&	1.375, 1.250,	00013870
000007	14		&	1.625, 1.500,	00013880
000007	15		&	1.660, 1.250,	00013890
000007	16		&	1.900, 1.500,	00013900
000007	17		&	2.125, 2.000,	00013910
000007	18		&	2.375, 2.000,	00013920
000007	19		&	2.625, 2.500,	00013930
000007	20		&	2.875, 2.500,	00013940
000007	21		&	3.125, 3.000,	00013950
000007	22		&	3.500, 3.000,	00013960
000007	23		&	3.625, 3.500,	00013970
000007	24		&	4.000, 3.500,	00013980
000007	25		&	4.500, 4.000,	00013990
000007	26		&	5.563, 5.000,	00014000
000007	27		&	6.625, 6.000,	00014010
000007	28		&	7.625, 7.000,	00014020
000007	29		&	8.625, 8.000,	00014030
000007	30		&	9.625, 9.000,	00014040
000007	31		&	10.750, 10.000,	00014050
000007	32		&	12.750, 12.000/	00014060
000007	33	C			00014070
000007	34	C			00014080
000007	35		DO 222 I=1, 25		00014090
000011	36		II=I		00014100
000012	37		ABSVAL=ABS(ODIPS(1, II)-OD)		00014110
000022	38	C			00014120
000022	39	C			00014130
000023	40		IF (ABSVAL .LT. 0.05) GO TO 444		00014140
000027	41		222 CONTINUE		00014150
000027	42	C			00014160
000027	43	C	THE OD IS NOT IN THE TABLE, USE THE OD AS THE IPS.		00014170
000033	44		IPS=OD		00014180
000035	45		RETURN		00014190
000035	46	C			00014200
000040	47		444 CONTINUE		00014210
000040	48		IPS=ODIPS(2, II)		00014220
000045	49		RETURN		00014230
000046	50		END		00014240

FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#
49	RETURN	46	RETURN	40	47				

TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#	TO LINE#	FROM LINE#
47	40	RETURN	46	RETURN	49				

OFFSET SYMBOLIC GLOBAL REFERENCES BY ALTER NUMBER

1	.DATA.				
7	.E.L..	.DATA.			
2	.FIAB.				
2	.SYMT.				
	ABS		37		
102	ABSVAL	.DATA.	4	37	40
77	1	.DATA.	35	36	
100	11	.DATA.	36	37	48
75	IPS	.DATA.	2	4	44
76	OD	.DATA.	2	4	37
	OD2IPS		2		
13	ODIPS	.DATA.	4	6	37
					48
27	.S222		35	41	
40	.S444		40	47	

EDIT DATE 06-29-83 < FT2.1U1 >

ELAPSED TIME (SEC) .27 LINES/MINUTE 10909

THERE WERE NO DIAGNOSTICS IN ABOVE COMPILATION
31K WORDS WERE USED FOR THIS COMPILATION

TRANSFERS....

FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#	
179	RETURN	162	169	155	163	154	147	151	176
140	152	138	143	135	143	131	143	128	132
121	152	120	152	117	136	116	139	94	98
92	95	88	100	83	98	81	84	79	98
77	80	75	98	73	76	71	98	69	72
67	98	65	68	63	98	61	64	59	98
57	60	55	98	53	56	49	98	43	50
40	89	37	41	36	38	34	98	31	35
24	105								

000746 178 C
000746 179
000752 180

RETURN
END

00013720
00013730
00013740

000575	119	C		00013130
000575	120	C	THIS CHARACTER MUST BE A NUMBER	00013140
000576	121		DECODE(DESLET,5100,ERR=7000) NO	00013150
000612	122	5100	FORMAT(11)	00013160
000612	123	C	MAKE A REAL NUMBER	00013170
000612	124		X=NO	00013180
000612	125	C		00013190
000612	126	C	SPLIT HERE DEPENDING WHETHER BEFORE OR AFTER DECIMAL PT.	00013200
000617	127		IF(DECFLG.EQ. 1) GO TO 5200	00013210
000622	128	C		00013220
000623	129		ODTOTL=(ODTOTL*10.0)+X	00013230
000627	130		GO TO 6000	00013240
000627	131	C		00013250
000630	132	5200	DECIMAL=DECIMAL*.1	00013260
000633	133		ODTOTL=ODTOTL+(X*DECIMAL)	00013270
000637	134		GO TO 6000	00013280
000637	135	C		00013290
000640	136	5300	DECFLG=1	00013300
000642	137		GO TO 6000	00013310
000642	138	C		00013320
000643	139	5500	CONTINUE	00013330
000643	140		IF (BLKFLG.EQ. 1) GO TO 7000	00013340
000647	141		IF (ODTOTL.GT. 0.05) BLKFLG=1	00013350
000652	142	C		00013360
000654	143	6000	CONTINUE	00013370
000654	144	C		00013380
000654	145	C	THE SIZE OF THIS FITTING CANNOT BE EXTRACTED,	00013390
000654	146	C	SO USE THE OD OF THE MAIN PIECE OF PIPE.	00013400
000650	147	6200	FITOD(K)=OD10	00013410
000663	148		FITSAM(K)=.TRUE.	00013420
000665	149		GO TO 9500	00013430
000665	150	C		00013440
000665	151	C		00013450
000666	152	7000	CONTINUE	00013460
000666	153		IF (ODTOTL.LT.0.05 .OR. ODTOTL.GT.99.9) GO TO 6200	00013470
000674	154	C		00013480
000675	155		IF (KOMPCH(IPEC(1,K),1,'P',1,1).EQ. 0) GO TO 8000	00013490
000712	156		X=ODTOTL	00013500
000714	157		GO TO 9000	00013510
000714	158	C		00013520
000714	159	C	THIS IS A PIPE, SO THE NOMINAL SIZE (IPS)	00013530
000714	160	C	MUST BE FOUND. SUB. OD2IPS GOES	00013540
000714	161	C	INTO THE TABLES USING THE TRUE O.D. TO	00013550
000714	162	C	EXTRACT THE NOMINAL SIZE.	00013560
000715	163	8000	CONTINUE	00013570
000715	164	C		00013580
000715	165		CALL OD2IPS(ODTOTL,X)	00013590
000715	166	C		00013600
000715	167	C		00013610
000715	168	C	CONVERT TO INTEGER---USE TEN TIMES THE NOMINAL SIZE	00013620
000722	169	9000	CONTINUE	00013630
000722	170		ODTOTL=(X*100.0)+1.0	00013640
000726	171		NO=ODTOTL	00013650
000734	172		FITOD(K)=NO/10	00013660
000734	173	C		00013670
000737	174		FITSAM(K)=(FITOD(K).EQ. OD10)	00013680
000737	175	C		00013690
000746	176	9500	CONTINUE	00013700
000746	177			00013710

000300	60	400 CONTINUE	00012540
000300	61	IF(KOMPCH(DES,1,'WELD-0-LET',1,10) .NE. 0) GO TO 450	00012550
000312	62	TC = 'W'	00012560
000321	63	GO TO 1800	00012570
000322	64	450 CONTINUE	00012580
000322	65	IF(KOMPCH(DES,1,'SOCKET',1,8) .NE. 0) GO TO 460	00012590
000334	66	TC = 'W'	00012600
000343	67	GO TO 1800	00012610
000344	68	460 CONTINUE	00012620
000344	69	IF(KOMPCH(DES,1,'BRAZOLET',1,8) .NE. 0) GO TO 470	00012630
000356	70	TC = 'W'	00012640
000365	71	GO TO 1800	00012650
000366	72	470 CONTINUE	00012660
000366	73	IF(KOMPCH(DES,1,'LATROLET',1,8) .NE. 0) GO TO 480	00012670
000400	74	TC = 'W'	00012680
000407	75	GO TO 1800	00012690
000410	76	480 CONTINUE	00012700
000410	77	IF(KOMPCH(DES,1,'SLEEVE',1,5) .NE. 0) GO TO 500	00012710
000422	78	TC = 'S'	00012720
000431	79	GO TO 1800	00012730
000432	80	500 CONTINUE	00012740
000432	81	IF(KOMPCH(DES,1,'BOSS',1,4) .NE. 0) GO TO 550	00012750
000444	82	TC = 'B'	00012760
000453	83	GO TO 1800	00012770
000454	84	550 CONTINUE	00012780
000454	85	950 CONTINUE	00012790
000460	86	GO TO 1900	00012800
000460	87	C	00012810
000460	88	C	00012820
000461	89	1000 CONTINUE	00012830
000461	90	DO 1500 I1=3,18	00012840
000463	91	I = I1	00012850
000464	92	IF(KOMPCH(DES,1,'SLIP-ON',1,7) .NE. 0) GO TO 1500	00012860
000476	93	CALL CONCAT(TC,3,'0',1,1)	00012870
000506	94	GO TO 1800	00012880
000507	95	1500 CONTINUE	00012890
000507	96	C	00012900
000507	97	C	00012910
000513	98	1800 CONTINUE	00012920
000513	99	TYPCOD(K)=TC	00012930
000516	100	1900 CONTINUE	00012940
000516	101	C	00012950
000516	102	C	00012960
000516	103	C	00012970
000516	104	C	00012980
000516	105	5000 CONTINUE	00012990
000516	106	ODTOTL=0.0	00013000
000520	107	BLKFLG=0	00013010
000521	108	DECFLG=0	00013020
000522	109	DECMAL=1.0	00013030
000522	110	C	00013040
000524	111	DO 6000 I1=1,10	00013050
000527	112	I=I1	00013060
000527	113	C	00013070
000530	114	CALL CONCAT(DESLET,1,DES,1,1)	00013080
000530	115	C	00013090
000540	116	IF (KOMPCH(DESLET,1,' ',1,1) .EQ. 0) GO TO 5500	00013100
000552	117	IF (KOMPCH(DESLET,1,' ',1,1) .EQ. 0) GO TO 5300	00013110
000564	118	IF (KOMPCH(DESLET,1,'X',1,1) .EQ. 0) GO TO 7000	00013120

000000	1	C	SUB. GETCOD(K)--STA25PI--EXTRACT TYPE CODE FROM THE DESCRIPTION	00011950
000006	2		SUBROUTINE GETCOD(K)	00011360
000006	3	C		00011970
000006	4	C	THE SECOND PART OF THIS ROUTINE EXTRACTS A FITTING OD	00011980
000006	5	C	FROM THE DESCRIPTION.	00011990
000006	6	C		00012000
000006	7		COMMON/FITING/ OD,NP,NX,NB,NF,MAT(25),IDES(6,25),DETAIL,	00012010
000006	8		& HULL(5),NFAB(25),IPEC(4,25),FABN(125,16),IPOINT(25),NPPPTS,	00012020
000006	9		& REV,ORNO(4),DWGNO(5)	00012030
000006	10	C		00012040
000006	11		COMMON/STDHRS/TYPCOD(25),MACHNO,OD10,HRTEMP	00012050
000006	12		CHARACTER TYPCOD,DES*24,TC,DESLET*1	00012060
000006	13	C		00012070
000006	14		COMMON/GETOD/ODFLAG,FITOD(25),FITSAM(25)	00012080
000006	15		INTEGER ODFLAG,FITOD,BLKFLG,DECFLG,OD10	00012090
000006	16		LOGICAL FITSAM	00012100
000006	17		REAL X,ODTOTL,DECMAL	00012110
000006	18	C		00012120
000006	19		CALL CONCAT(DES,1,IDES(1,K),1,4)	00012130
000021	20		CALL CONCAT(DES,5,IDES(2,K),1,4)	00012140
000034	21		CALL CONCAT(DES,9,IDES(3,K),1,4)	00012150
000037	22	C		00012160
000047	23		IF (ODFLAG .EQ. 2) GO TO 5000	00012170
000052	24	C		00012180
000053	25		CALL CONCAT(DES,13,IDES(4,K),1,4)	00012190
000066	26		CALL CONCAT(DES,17,IDES(5,K),1,4)	00012200
000101	27		CALL CONCAT(DES,21,IDES(6,K),1,4)	00012210
000104	28	C		00012220
000104	29	C	CERTAIN INFORMATION ABOUT THE FITTING TYPE CAN BE	00012230
000104	30	C	GAINED BY EXAMINING THE PIECE NUMBER OF THE FITTING.	00012240
000114	31		IF (KOMPCH(IPEC(1,K),1,'P',1,1) .NE. 0) GO TO 150	00012250
000131	32		TC='P'	00012260
000140	33		GO TO 1800	00012270
000140	34	C		00012280
000141	35	150	CONTINUE	00012290
000141	36		IF (KOMPCH(IPEC(1,K),1,'FL',1,2) .EQ. 0) GO TO 200	00012300
000156	37		IF (KOMPCH(IPEC(1,K),1,'J',1,1) .NE. 0) GO TO 250	00012310
000173	38	200	TC='F'	00012320
000202	39		GO TO 1000	00012330
000202	40	C		00012340
000203	41	250	CONTINUE	00012350
000203	42		IF (KOMPCH(IPEC(1,K),1,'F',1,1) .EQ. 0) GO TO 300	00012360
000217	43	C	SINCE NONE OF THE ABOVE, THIS MUST BE A VALVE	00012370
000220	44		TC='V'	00012380
000227	45		GO TO 1800	00012390
000227	46	C		00012400
000227	47	C		00012410
000227	48	C		00012420
000227	49	C		00012430
000230	50	300	CONTINUE	00012440
000230	51		DO 950 I1=2,22	00012450
000233	52		I = I1	00012460
000234	53		IF(KOMPCH(DES,1,'TEE',1,3) .NE. 0) GO TO 325	00012470
000246	54		TC = 'T'	00012480
000255	55		GO TO 1800	00012490
000256	56	325	CONTINUE	00012500
000256	57		IF(KOMPCH(DES,1,'WELDOLET',1,8) .NE. 0) GO TO 400	00012510
000270	58		TC = 'W'	00012520
000277	59		GO TO 1800	00012530

3752	.S2362	947	948	953	954	955	956	957	958	970					
4013	.S2365	971	980												
4026	.S2367	972	988												
4041	.S2380	888	891	923	926	931	934	939	942	975	978	983	986	991	
		994	997												
4065	.S2382	1003	1008												
4231	.S2384	1004	1023												
4311	.S2385	826	827	901	967	1000	1008	1009	1010	1011	1012	1013	1014	1015	
		1016	1017	1035											
4316	.S2390	818	821	1038											
4321	.S2395	816	1040												
4327	.S3000	223	317	1051											
4346	.S3020	1054	1062												
4660	.S3030	1065	1081												
5170	.S3040	1082	1098												
5213	.S3045	1105	1108												
5227	.S3050	1100	1103	1108	1111										
5250	.S3072	1117													
5333	.S3090	1125	1130												
5370	.S3100	1042	1108	1109	1131	1136									
5406	.S4015	1138	1144												
5407	.S4019	1142	1146												
5426	.S4035	1147	1153												
5427	.S4039	1151	1155												
5446	.S4045	1156	1162												
5447	.S4049	1160	1164												
5473	.S4055	1165	1173												
5474	.S4059	1171	1175												
2342	.S4100	1177	1179												
2305	.S9876	1183	1191												
5543	.S9900	1188	1189												
5552	.S9990	1186	1193												

EDIT DATE 06-29-83 < FT2.101 >

ELAPSED TIME (SEC) 3.40 LINES/MINUTE 21018

THERE WERE 2 DIAGNOSTICS IN ABOVE COMPILATION
32K WORDS WERE USED FOR THIS COMPILATION

371	.S930	307	308	312									
376	.S940	278	280	283	294	295	296	297	302	306	311	313	
456	.S1000	337	348										
571	.S1001	360	362	363	370								
700	.S1002	371	372	373	374	375	376	377	380				
711	.S1003	352	353	365	378	384							
716	.S1004	386											
722	.S1005	349	392										
730	.S1006	328	331	387	397								
733	.S1008	326	399										
1040	.S1012	426	430	435									
1070	.S1014	435	444										
1102	.S1015	442	448										
1130	.S1016	439	440	445	446	456							
1143	.S1019	420	463										
1171	.S1020	465	470										
1252	.S1022	478	482	487									
1301	.S1025	487	491	492	495								
1331	.S1029	466	505										
1365	.S1034	509	510	513									
1406	.S1038	433	506	511	520								
1524	.S1041	535	557										
1573	.S1043	560	561	562	564	565	567						
1611	.S1044	559	572										
1616	.S1045	529	530	536	543	555	576						
1623	.S1060	412	415	454	461	485	495	498	499	502	518	580	
1626	.S1065	410	581										
1746	.S1072	605	616										
1753	.S1074	602	603	606	610	614	620						
1760	.S1076	594	597	599	624								
1763	.S1078	592	626										
1772	.S1300	640											
2153	.S1305	669	680										
2222	.S1310	690	693	698									
2257	.S1315	696	698	709									
2302	.S1320	684	715										
2336	.S1330	719	720	723									
2346	.S1340	716	728										
2371	.S1350	729	734										
2414	.S1360	735	740										
2437	.S1370	710	721	741	746								
2446	.S1380	712	731	737	743	750							
2522	.S1388	761	768										
2531	.S1389	753	754	757	765	770							
2536	.S1390	663	666	704	705	707	725	773					
2541	.S1395	661	775										
2546	.S2000	785											
3164	.S2320	832	859										
3247	.S2331	873	875	879									
3253	.S2332	870	871	883									
3301	.S2340	886	894										
3327	.S2342	895	897										
3336	.S2347	900											
3342	.S2350	896	904										
3507	.S2352	905	906	907	908	909	910	911	912	913	914	917	
3552	.S2355	919	928										
3565	.S2357	920	936										
3600	.S2360	915	946										
2272	.S2361	960	961										

FORMAT

2	GETOD		71															
44.12	GRNO	FITTING	57	1177														
33	HRTEMP	STDHRS	62	63	654													
265	HULL	FITTING	57	1177														
2157	1	. DATA.	199	200	201	202	542	543	547	549	609	610	612					
467	IABN	FITTING	66	78	287	291												
2223	IARG	DATA,	66	449	450	451	452	453	541	542	548	550	608	609	6	1	3	
			887	890	922	925	930	933	938	941	974	977	982	985	990			
			993	997	1003	1004	1023	1024	1032	1126	1127	1128	1132	1133	1134			
2338	IBT	DATA	64	1141	1144	1177												
36	IDES	FITTING	57															
2336	IFT	.DATA,	64	1159	1162	1177												
2335	IMT	.DATA,	64	1150	1153	1177												
2165	IND	.DATA,	230	253	260	262	270	273	276	321	351	352	397	405	4	2	4	
			425	428	429	470	471	480	481	509	510	514	515	516	517			
			528	529	560	500	587	601	602	624	638	689	692	719	720			
			752	753	773	785	825	826	1038									
2221	INDCEN	DATA	66	425	429	471	475	476	481	495	498	499	5	501	589			
			690	692	693	698	703	704	705	706								
2170	INDEND	.DATA,	66	253	262	270	351	352	424	426	428	430	435	438	439			
			440	441	445	446	449	450	451	459	460	470	473	474	478			
			480	482	487	490	491	492	493	528	529	560	601	602	752			
			753	825	826													
323	IPEC	FITTING	57	257	328	412	594	663	818									
4407	IPOINT	FITTING	57	308														
16	IPREP		1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1085			
			1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1127	1133			
2175	IPTA	.DATA,	287	291	308													
2235	IWSIZE	.DATA,	66	788	789	790	791	792	793	794	795	796	797	798	799			
			800	801	802	803	804		806		808	809	810	831				
2340	IWT	.DATA.	64	1170	1173	1177												
2173	J	.DATA,	262	263	270	271	290	291	292	294	295	299	300	301	307			
			308	352	353	356	362	363	365	367	529	530	535	536	538			
			539	541	545	546	547	840	549	550	561	573						
			605	606	608	753	754	757	758	826	827	832						
			871	875	877	881	960	1024	1027	1028	1029	1030	1188	1189				
2202	JJ	.DATA.	333	342	394	560	561	562	563	564	565	556						
1352	JTFIT	.DATA,	72	263	271	449	541	608										
1155	JTOD	.DATA.	72	450	459	473	475	514	516	538	547	549	573	8	3	41027		
			1028	1029	1030													
760	JTSAME	.DATA.	73	451	460	474	476	515	517	539	548	550	574	832				
2237	JTSIZE	.DATA.	72	831	635	836	837	838	839	840	841	842	843	844	845			
			846	847	848	849	850	851	852	853	854	855	856	857	897			
			997	1026	1027	1028	1029	1030	1032	1119	1120	1121	1122	1123	1128			
			1134															
2167	K	.DATA	252	253	256	257	271	273	278	280	283	285	286	287	289			
			290	296	297	298	300	301	309	310	326	328	331	333	337			
			349	351	382	397	410	412	415	420	452	453	457	458	465			
			466	473	474	475	476	506	514	515	516	517	523	538	539			
			543	553	559	570	580	592	594	597	599	601	610	612	613			
			617	618	624	661	663	666	669	671	684	710	716	729	735			
			741	752	761	773	816	818	821	825	886	895	896	919	920			
			971	972	1038													
22	KOMPCH		257	294	295	296	297	328	337	349	360	365	371	372	373			
			374	375	376	377	412	420	426	430	465	466	478	482	506			
			559	594	599	663	684	690	693	710	716	729	735	741	757			
			761	818	873	875	886	895	896	905	906	907	908	909	910			
			911	912	913	914	919	920	947	948	951	954	955	956	957			
			971	972	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017				

TRANSFERS....

TO LINE# FROM LINE#		TO LINE# FROM LINE#		TO LINE# FROM LINE#		TO LINE# FROM LINE#		TO LINE# FROM LINE#	
1193	1187	1175	1172	1173	1166	1164	1161	1162	1157
1155	1152	1153	1148	1146	1143	1144	1139	1136	1131
1136	1110	1136	1108	1136	1050	1130	1125	1111	1104
1111	1102	1111	1107	1108	1105	1098	1084	1081	1067
1062	1055	1051	320	1051	229	1038	824	1038	820
1035	1013	1035	1012	1035	1011	1035	1010	1035	1009
1035	1008	1035	1002	1035	969	1035	903	1035	828
1035	1022	1035	1016	1035	1015	1035	1014	1023	1007
1008	1003	997	945	997	939	997	935	997	931
997	927	997	923	997	991	997	893	997	888
997	987	997	983	997	979	997	975	997	996
988	973	980	971	970	952	970	947	970	959
970	957	970	956	970	955	970	954	970	953
946	916	936	921	928	919	917	906	917	905
917	914	917	913	917	912	917	911	917	910
917	909	917	908	917	907	904	896	897	895
894	886	883	870	883	872	879	874	879	876
859	833	773	705	773	704	773	667	773	665
773	727	773	708	770	756	770	767	770	757
768	763	750	714	750	739	750	733	750	745
746	741	746	710	746	722	740	735	734	729
728	718	723	720	723	719	715	688	709	697
709	698	698	691	698	695	680	670	624	596
624	600	624	598	620	611	620	607	620	604
620	615	616	605	580	499	580	498	580	497
580	486	580	462	580	455	580	419	580	414
580	519	580	504	576	556	576	544	576	537
576	534	572	559	567	564	567	562	567	561
567	565	557	535	520	512	520	434	520	508
513	509	513	510	505	469	495	492	495	491
495	489	487	484	487	479	470	465	463	423
456	440	456	439	456	447	456	445	448	443
444	437	435	427	435	432	397	330	397	391
397	332	392	350	384	355	384	379	384	366
380	377	380	376	380	375	380	374	380	373
380	372	380	371	370	364	370	362	370	361
348	340	313	306	313	302	313	297	313	296
313	295	313	294	313	284	313	282	313	311
312	308	305	289	303	293	303	291	273	268
269	259	260	256	260	257	209	198	209	196
RETURN	1193								

TRANSFERS....

FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#		FROM LINE# TO LINE#	
1193	RETURN	1187	1193	1172	1175	1166	1173	1161	1164
1157	1162	1152	1155	1148	1153	1143	1146	1139	1144
1131	1136	1125	1130	1110	1136	1108	1136	1107	1111
1105	1108	1104	1111	1102	1111	1084	1098	1067	1081
1055	1062	1050	1136	1022	1035	1016	1035	1015	1035
1014	1035	1013	1035	1012	1035	1011	1035	1010	1035
1009	1035	1008	1035	1007	1023	1003	1008	1002	1035
996	997	991	997	987	997	983	997	979	997
975	997	973	988	971	980	969	1035	959	970
957	970	956	970	955	970	954	970	953	970
952	970	947	970	945	997	939	997	935	997
931	997	927	997	923	997	921	936	919	928
916	946	914	917	913	917	912	917	911	917
910	917	909	917	908	917	907	917	906	917
905	917	903	1035	896	904	895	897	893	997
888	997	886	894	876	879	874	879	872	883
870	883	833	859	828	1035	824	1038	820	1038
767	770	763	768	757	770	756	770	745	750
741	746	739	750	735	740	733	750	729	734
727	773	722	748	720	723	719	723	718	728
714	750	710	746	708	773	705	773	704	773
698	709	697	709	695	698	691	698	688	715
670	680	667	773	665	773	615	620	611	620
607	620	605	616	604	620	600	624	598	624
596	624	565	567	564	567	562	567	561	567
559	572	556	576	544	576	537	576	535	557
534	576	519	580	512	520	510	513	509	513
508	520	504	580	499	580	498	580	497	580
492	495	491	495	489	495	486	580	484	487
479	487	469	505	465	470	462	580	455	580
447	456	445	456	443	448	440	456	439	456
437	444	434	520	432	435	427	435	423	463
419	580	414	580	391	397	379	384	377	380
376	380	375	380	374	380	373	380	372	380
371	380	366	384	364	370	362	370	361	370
355	384	350	392	340	348	332	397	330	397
320	1051	311	313	308	312	306	313	302	313
297	313	296	313	295	313	294	313	293	303
291	303	289	305	284	313	282	313	268	273
259	269	257	260	256	260	229	1051	198	209
196	209								

005535	1181		& 5A4, 18X, A2, '/', A1, 17X,	00011810
005535	1182		& 4(14))	00011820
005535	1183	c		00011830
005535	1184	c		00011840
005535	1185	c		00011850
025535	1186		IF (NE,EO, O) GO TO 9990	00011860
005537	1187	c	ZERO OUT SHOPJT ARRAY FOR NEXT TIME THROUGH	00011870
005540	1188		DO 9900 J=1, MAXINO	00011880
005543	1189	9900	,SHUPJT(J)=O	00011890
005344	1190	c		00011900
005552	1191	9876	FORMAT(V)	00011910
005552	1192	c		00011920
005552	1193	9990	RETURN	00011930
003556	1194		END	00011940

(***W 1470 EQUALITY OR NON-EQUALITY COMPARISON MAY NOT BE MEANINGFUL IN LOGICAL IF EXPRESSIONS

(***W 7 MEMORY EXPANDED. USE SLIMITS OR CORE= OPTION FOR NEXT RUN

005264	1122		IF (OD10 .GT. 81) JTSIZE=4	00011220
005271	1123		IF (UD10 .GT. 141) JTSIZE=5	00011230
005274	1124	C		00011240
005276	1125		IF (FLAG1 .EQ. 0) GO TO 3090	00011250
005301	1126		IARG=1	00011260
005303	1127		IF (KOMPCH(IPREP(1),1,'PN-2',1,4) .EQ. 0) IARG=5	00011270
005323	1128		MTOTAL=MTOTAL+MCHING(IARG,JTSIZE)	00011280
005323	1129	C		00011290
005333	1130	3090	CONTINUE	00011300
005333	1131		IF (FLAG2 .EQ. 0) GO TO 3100	00011310
005336	1132		IARG=1	00011320
005340	1133		IF (KOMPCH(IPREP(3),1,'PN-2',1,4) .EQ. 0) IARG=5	00011330
005360	1134		MTOTAL=MTOTAL+MCHING(IARG,JTSIZE)	00011340
005360	1135	C		00011350
005370	1136	3100	CONTINUE	00011360
005370	1137	C		00011370
005370	1138		IF (NB .EQ. 0) GO TO 4015	00011380
005372	1139	C		00011390
005373	1140		BTOTAL=(BTOTAL*10.0) + 0.001	00011400
005377	1141		IBT=BTOTAL	00011410
005405	1142		GO TO 4019	00011420
005405	1143	C		00011430
005406	1144	4015	IBT=0.0	00011440
005406	1145	C		00011450
005407	1146	4019	CONTINUE	00011460
005407	1147		IF (MTOTAL .LT. 0.03) GO TO 4035	00011470
005412	1148	C		00011480
005413	1149		MTOTAL=(MTOTAL*10.0) + 0.001	00011490
005417	1150		IMT=MTOTAL	00011500
005425	1151		GO TO 4039	00011510
005425	1152	C		00011520
005426	1153	4035	IMT=0.0	00011530
005426	1154	C		00011540
005427	1155	4039	CONTINUE	00011550
005427	1156		IF (FTOTAL .LT. 0.03) GO TO 4045	00011560
005432	1157	C		00011570
005433	1158		FTOTAL=(FTOTAL*10.0) + 0.001	00011580
005437	1159		IFT=FTOTAL	00011590
005445	1160		GO TO 4049	00011600
005445	1161	C		00011610
005446	1162	4045	IFT=0.0	00011620
005446	1163	C		00011630
005447	1164	4049	CONTINUE	00011640
005447	1165		IF (WTOTAL .LT. 0.03) GO TO 4055	00011650
005452	1166	C		00011660
005453	1167		IF (WTOTAL .GT. 1000.0) WTOTAL=999.9	00011670
005456	1168	C		00011680
005460	1169		WTOTAL=(WTOTAL*10.0) + 0.001	00011690
005464	1170		IWT=WTOTAL	00011700
005472	1171		GO TO 4059	00011710
005472	1172	C		00011720
005473	1173	4055	IWT=0.0	00011730
005473	1174	C		00011740
005474	1175	4059	CONTINUE	00011750
005474	1176	C		00011760
005474	1177		WRITE(18,4100) GRNO,DWGNO,HULL,DETAIL,REV,	00011770
0054835	1178		& IBT,IMT,IFT,IWT	00011780
005535	1179	4100	FORMAT(15,16,14,A3,	00011790
005535	1180		& A5,A6,A4,A3,A6,	00011800

004347	1063		FLAG2=0	00010630
004347	1064	C		00010640
004350	1065		IF (TEMP(1).GT.0.1) GO TO 3030	00010650
004357	1066	C		00010660
004357	1067	C	SEE IF 'V' JOINT (BUTTWELD)	00010670
004360	1068		IF (KOMPCH(IPREP(1),1,'P4',1,3).EQ.0) FLAG1=1	00010680
004400	1069		IF (KOMPCH(IPREP(1),1,'P3',1,3).EQ.0) FLAG1=1	00010690
004420	1070		IF (KOMPCH(IPREP(1),1,'PN-2',1,4).EQ.0) FLAG1=1	00010700
004440	1071		IF (KOMPCH(IPREP(1),1,'PN-1',1,4).EQ.0) FLAG1=1	00010710
004460	1072		IF (KOMPCH(IPREP(1),1,'PN-3',1,4).EQ.0) FLAG1=1	00010720
004500	1073		IF (KOMPCH(IPREP(1),1,'PN-5',1,4).EQ.0) FLAG1=1	00010730
004520	1074		IF (KOMPCH(IPREP(1),1,'PN-8',1,4).EQ.0) FLAG1=1	00010740
004540	1075		IF (KOMPCH(IPREP(1),1,'P22',1,3).EQ.0) FLAG1=1	00010750
004560	1076		IF (KOMPCH(IPREP(1),1,'P24',1,3).EQ.0) FLAG1=1	00010760
004600	1077		IF (KOMPCH(IPREP(1),1,'P10',1,3).EQ.0) FLAG1=1	00010770
004620	1078		IF (KOMPCH(IPREP(1),1,'P5',1,3).EQ.0) FLAG1=1	00010780
004640	1079		IF (KOMPCH(IPREP(1),1,'P68A',1,4).EQ.0) FLAG1=1	00010790
004656	1080	C		00010800
004660	1081		3030 CONTINUE	00010810
004660	1082		IF (TEMP(2).GT.0.1) GO TO 3040	00010820
004667	1083	C		00010830
004667	1084	C	SEE IF 'V' JOINT (BUTTWELD)	00010840
004670	1085		IF (KOMPCH(IPREP(3),1,'P4',1,3).EQ.0) FLAG2=1	00010850
004710	1086		IF (KOMPCH(IPREP(3),1,'P3',1,3).EQ.0) FLAG2=1	00010860
004730	1087		IF (KOMPCH(IPREP(3),1,'PN-2',1,4).EQ.0) FLAG2=1	00010870
004750	1088		IF (KOMPCH(IPREP(3),1,'PN-1',1,4).EQ.0) FLAG2=1	00010880
004770	1089		IF (KOMPCH(IPREP(3),1,'PN-3',1,4).EQ.0) FLAG2=1	00010890
005010	1090		IF (KOMPCH(IPREP(3),1,'PN-5',1,4).EQ.0) FLAG2=1	00010900
005030	1091		IF (KOMPCH(IPREP(3),1,'PN-8',1,4).EQ.0) FLAG2=1	00010910
005050	1092		IF (KOMPCH(IPREP(3),1,'P22',1,3).EQ.0) FLAG2=1	00010920
005070	1093		IF (KOMPCH(IPREP(3),1,'P24',1,3).EQ.0) FLAG2=1	00010930
005110	1094		IF (KOMPCH(IPREP(3),1,'P10',1,3).EQ.0) FLAG2=1	00010940
005130	1095		IF (KOMPCH(IPREP(3),1,'P5',1,3).EQ.0) FLAG2=1	00010950
005150	1096		IF (KOMPCH(IPREP(3),1,'P68A',1,4).EQ.0) FLAG2=1	00010960
005166	1097	C		00010970
005170	1098		3040 CONTINUE	00010980
005170	1099	C	EVERY STRAIGHT PIPE HAS A JOB SETUP TIME.	00010990
005170	1100		IF (NB.EQ.0) GO TO 3050	00011000
005172	1101	C		00011010
005172	1102	C		00011020
005173	1103		IF (FLAG1+FLAG2.GT.0) GO TO 3050	00011030
005177	1104	C		00011040
005200	1105		IF (AD1.LT.0.1) GO TO 3045	00011050
005204	1106		IF (TEMP(1).LT.0.1) GO TO 3050	00011060
005212	1107	C		00011070
005213	1108		3045 IF (ADN.LT.0.1) GO TO 3100	00011080
005217	1109		IF (TEMP(2).GT.0.1) GO TO 3100	00011090
005226	1110	C		00011100
005227	1111		3050 CONTINUE	00011110
005227	1112		IF (OD10.GT.162) MPSIZE=6	00011120
005234	1113		IF (OD10.GT.202) MPSIZE=7	00011130
005237	1114	C		00011140
005241	1115		FTOTAL=FTOTAL+FABHRS(SETUP,MPSIZE)	00011150
005241	1116	C		00011160
005250	1117		3072 CONTINUE	00011170
005250	1118	C		00011180
005250	1119		JTSIZE=1	00011190
005252	1120		IF (OD10.GT.11) JTSIZE=2	00011200
005257	1121		IF (OD10.GT.41) JTSIZE=3	00011210

004061	1004		IF (IARG .NE. 8) GO TO 2384	00010040
004064	1005	C		00010050
004064	1006	C	THERE NEEDS TO BE A MACHINING VALUE ADDED ON IF THIS FLANGE	00010060
004064	1007	C	IS BUTT WELDED, BUT NOT IF IT IS SOCKET WELDED.	00010070
004065	1008		2382 IF (KOMPCH(FABNJT,1,'P41',1,3) .EQ. 0) GO TO 2385	00010080
004077	1009		IF (KOMPCH(FABNJT,1,'P14',1,3) .EQ. 0) GO TO 2385	00010090
004111	1010		IF (KOMPCH(FABNJT,1,'P2',1,3) .EQ. 0) GO TO 2385	00010100
004123	1011		IF (KOMPCH(FABNJT,1,'P15',1,3) .EQ. 0) GO TO 2385	00010110
004135	1012		IF (KOMPCH(FABNJT,1,'PN-7',1,4) .EQ. 0) GO TO 2385	00010120
004147	1013		IF (KOMPCH(FABNJT,1,'PN14',1,4) .EQ. 0) GO TO 2385	00010130
004161	1014		IF (KOMPCH(FABNJT,1,'P17',1,3) .EQ. 0) GO TO 2385	00010140
004173	1015		IF (KOMPCH(FABNJT,1,'P16',1,3) .EQ. 0) GO TO 2385	00010150
004205	1016		IF (KOMPCH(FABNJT,1,'V28',1,3) .EQ. 0) GO TO 2385	00010160
004217	1017		IF (KOMPCH(FABNJT,1,'P43',1,3) .EQ. 0) GO TO 2385	00010170
004230	1018	C		00010180
004230	1019	C	NOW DETERMINE WHICH MACHINING VALUE TO USE,	00010190
004230	1020	C	WHETHER FOR STRAIGHT BEVEL OR J BEVEL.	00010200
004230	1021	C	('PN-2' IS THE ONLY J BEVEL.) NOTE THAT ONLY BUTTWELDS	00010210
004230	1022	C	REQUIRE BEVELS.	00010220
004231	1023		2384 IARG=1	00010230
004233	1024		IF (KOMPCH(FABN(J,8),1,'PN-2',1,4) .EQ. 0) IARG=5	00010240
004245	1025	C		00010250
004247	1026		JTSIZE=1	00010260
004251	1027		IF (JTOD(J) .GT. 14) JTSIZE=2	00010270
004257	1028		IF (JTOD(J) .GT. 46) JTSIZE=3	00010280
004265	1029		IF (JTOD(J) .GT. 92) JTSIZE=4	00010290
004273	1030		IF (JTOD(J) .GT. 142) JTSIZE=5	00010300
004277	1031	C		00010310
004301	1032		MTOTAL=MTOTAL+MCHING(IARG,JTSIZE)	00010320
004306	1033	C		00010330
004306	1034	C		00010340
004311	1035		2385 CONTINUE	00010350
004311	1036	C		00010360
004311	1037	C	ARRAY NFAB TELLS NO. OF LINES PER FITTING.	00010370
004316	1038		2390 IND=IND+NFAB(K)	00010380
004316	1039	C		00010390
004321	1040		2395 CONTINUE	00010400
004321	1041	C		00010410
004326	1042		GO TO 3100	00010420
004326	1043	C		00010430
004326	1044	C		00010440
004326	1045	C		00010450
004326	1046	C		00010460
004326	1047	C		00010470
004326	1048	C		00010480
004326	1049	C	BEFORE WRITING OUT RESULTS, CHECK FOR FABRICATION	00010490
004326	1050	C	ON BEND ONLY DETAILS.	00010500
004327	1051		3000 CONTINUE	00010510
004327	1052	C		00010520
004327	1053	C	FIRST CHECK IF TEMPLATE SET-UP TIME IS NEEDED.	00010530
004327	1054		IF (HRTMP .NE. 'T') GO TO 3020	00010540
004337	1055	C		00010550
004340	1056		FTOTAL=FABHRC(SETUP,MPSIZE)	00010560
004345	1057	C		00010570
004345	1058	C	IF NOT BOTH ENDS OF THE MAIN PIECE OF PIPE ARE	00010580
004345	1059	C	TEMPLATED OR A CUT LENGTH IS REQUIRED OR THE END	00010590
004345	1060	C	PREP INDICATES A BUTTWELD, THEN THIS DETAIL REQUIRES	00010600
004345	1061	C	A JOB SET-UP TIME EVEN THOUGH THERE ARE NO FITTINGS.	00010610
004345	1062		3020 FLAG1=0	00010620

003577	945	C	SEE IF 'V' JOINT	00009450
003600	946		2360 CONTINUE	00009460
003600	947		IF (KOMPCH(FABNJT,1,'P4',1,3).EQ. 0) GO TO 2362	00009470
003612	948		IF (KOMPCH(FABNJT,1,'P3',1,3).EQ. 0) GO TO 2362	00009480
003623	949	C	THE FOLLOWING TAKES CARE OF THE CASES 'PN-1A', 'PN-1B',	00009490
003623	950	C	'PN-2', 'PN-3A', 'PN-3B', 'PN-5', & 'PN-8',	00009500
003623	951	C	NOTE THAT THE CASES OF 'PN-7' & 'PN-7B' HAVE BEEN	00009510
003623	952	C	REMOVED FROM CONSIDERATION BY THE SOCKET WELD SECTION.	00009520
003624	953		IF (KOMPCH(FABNJT,1,'PN-',1,3).EQ. 0) GO TO 2362	00009530
003636	954		IF (KOMPCH(FABNJT,1,'P22',1,3).EQ. 0) GO TO 2362	00009540
003650	955		IF (KOMPCH(FABNJT,1,'P24',1,3).EQ. 0) GO TO 2362	00009550
003662	956		IF (KOMPCH(FABNJT,1,'P10',1,3).EQ. 0) GO TO 2362	00009560
003674	957		IF (KOMPCH(FABNJT,1,'P5',1,3).EQ. 0) GO TO 2362	00009570
003706	958		IF (KOMPCH(FABNJT,1,'P68A',1,4).EQ. 0) GO TO 2362	00009580
003717	959	C		00009590
003720	960		WRITE(6,2361) FABNJT,FABN(J,7)	00009600
003735	961		2361 FORMAT(' UNLISTED JOINT TYPE, NO VALUE GIVEN. JOINT',	00009610
003735	962		& ' TYPE=' , 2A4)	00009620
003735	963		WRITE(6,9876) '-----ALL JOINT TYPES FAILED'	00009630
003742	964	C		00009640
003746	965		WTOTAL=WTOTAL+9000.0	00009650
003746	966	C		00009660
003751	967		GO TO 2385	00009670
003751	968	C		00009680
003751	969	C		00009690
003752	970		2362 CONTINUE	00009700
003752	971		IF (KOMPCH(MAT(K),1,'CS',1,2).EQ. 0) GO TO 2365	00009710
003765	972		IF (KOMPCH(MAT(K),1,'CM',1,2).EQ. 0) GO TO 2367	00009720
003777	973	C	CASE OF CUNI OR CRES	00009730
004000	974		IARG=4	00009740
004002	975		IF (CUVJT1.EQ. 1) GO TO 2380	00009750
004006	976		CUVJT1=1	00009760
004010	977		IARG=3	00009770
004012	978		GO TO 2380	00009780
004012	979	C		00009790
004013	980		2365 CONTINUE	00009800
004013	981	C	CASE OF CARBON STEEL	00009810
004013	982		IARG=2	00009820
004015	983		IF (CSVJT1.EQ. 1) GO TO 2380	00009830
004021	984		CSVJT1=1	00009840
004023	985		IARG=1	00009850
004025	986		GO TO 2380	00009860
004025	987	C		00009870
004026	988		2367 CONTINUE	00009880
004026	989	C	CASE OF CHROME MOLY	00009890
004026	990		IARG=6	00009900
004030	991		IF (OMVJT1.EQ. 1) GO TO 2380	00009910
004034	992		OMVJT1=1	00009920
004036	993		IARG=5	00009930
004040	994		GO TO 2380	00009940
004040	995	C		00009950
004040	996	C		00009960
004041	997		2380 WTOTAL=WTOTAL+WELDS(IARG,JTSIZE)	00009970
004046	998	C		00009980
004046	999	C	SOCKET WELDS DO NOT HAVE MACHINING TIME	00009990
004051	1000		IF (SWFLAG.EQ. 1) GO TO 2385	00010000
004054	1001	C		00010010
004054	1002	C	FLANGES COULD BE SOCKET WELDS. IF SO. SKIP MACHINING STEP.	00010020
004055	1003			00010030

003253	886		IF (KOMPCH(TYPCOD(K),1,'F',1,1) .NE. 0) GO TO 2340	00008860
003266	887		IARG=8	00008870
003270	888		IF (FLG1 .EQ. 1) GO TO 2380	00008880
003274	889		FLG1=1	00008890
003276	890		IARG=7	00008900
003300	891		GO TO 2380	00008910
003300	892	C		00008920
003300	893	C	SEE IF BOSS	00008930
003301	894		2340 CONTINUE	00008940
003301	895		IF (KOMPCH(TYPCOD(K),1,'W',1,1) .EQ. 0) GO TO 2342	00008950
003314	896		IF (KOMPCH(TYPCOD(K),1,'B',1,1) .NE. 0) GO TO 2350	00008960
003327	897		2342 WTOTAL=WTOTAL+WELDS(15,JTSIZE)	00008970
003333	898	C		00008980
003333	899	C	THE MACHINING VALUE FOR BOSSES/WELDOLETS IS ALWAYS 0.4.	00008990
003336	900		2347 MTOTAL=MTOTAL+0.4	00009000
003341	901		GO TO 2385	00009010
003341	902	C		00009020
003341	903	C	SEE IF SOCKET WELD OR FILLET WELD (TIMED THE SAME)	00009030
003342	904		2350 CONTINUE	00009040
003342	905		IF (KOMPCH(FABNJT,1,'P41',1,3) .EQ. 0) GO TO 2352	00009050
003354	906		IF (KOMPCH(FABNJT,1,'P14',1,3) .EQ. 0) GO TO 2352	00009060
003366	907		IF (KOMPCH(FABNJT,1,'P2',1,3) .EQ. 0) GO TO 2352	00009070
003400	908		IF (KOMPCH(FABNJT,1,'P15',1,3) .EQ. 0) GO TO 2352	00009080
003412	909		IF (KOMPCH(FABNJT,1,'PN-7',1,4) .EQ. 0) GO TO 2352	00009090
003424	910		IF (KOMPCH(FABNJT,1,'PN14',1,4) .EQ. 0) GO TO 2352	00009100
003436	911		IF (KOMPCH(FABNJT,1,'P17',1,3) .EQ. 0) GO TO 2352	00009110
003450	912		IF (KOMPCH(FABNJT,1,'P16',1,3) .EQ. 0) GO TO 2352	00009120
003462	913		IF (KOMPCH(FABNJT,1,'V28',1,3) .EQ. 0) GO TO 2352	00009130
003474	914		IF (KOMPCH(FABNJT,1,'P43',1,3) .EQ. 0) GO TO 2352	00009140
003506	915		GO TO 2360	00009150
003506	916	C		00009160
003507	917		2352 CONTINUE	00009170
003507	918		SWFLAG=1	00009180
003511	919		IF (KOMPCH(MAT(K),1,'CS',1,2) .EQ. 0) GO TO 2355	00009190
003524	920		IF (KOMPCH(MAT(K),1,'CM',1,2) .EQ. 0) GO TO 2357	00009200
003536	921	C	CASE OF CUNI OR CRES	00009210
003537	922		IARG=12	00009220
003541	923		IF (CUSW1 .EQ. 1) GO TO 2380	00009230
003545	924		CUSW1=1	00009240
003547	925		IARG=11	00009250
003551	926		GO TO 2380	00009260
003551	927	C		00009270
003552	928		2355 CONTINUE	00009280
003552	929	C	CASE OF CARBON STEEL	00009290
003552	930		IARG=10	00009300
003554	931		IF (CSSW1 .EQ. 1) GO TO 2380	00009310
003560	932		CSSW1=1	00009320
003562	933		IARG=9	00009330
003564	934		GO TO 2380	00009340
003564	935	C		00009350
003565	936		2357 CONTINUE	00009360
003565	937	C	CASE OF CHROME MOLY	00009370
003565	938		IARG=14	00009380
003567	939		IF (CMSW1 .EQ. 1) GO TO 2380	00009390
003573	940		CMSW1=1	00009400
003575	941		IARG=13	00009410
003577	942		GO TO 2380	00009420
003577	943	C		00009430
003577	944	C		00009440

002765	827		IF (SHOPJT(J) .LT. 2) GO TO 2385	00008270
002771	828	C		00008280
002772	829		SWFLAG=0	00008290
002772	830	C		00008300
002773	831		JTSIZE=IWSIZE	00008310
002775	832		IF (JTSAME(J)) GO TO 2320	00008320
003000	833	C		00008330
003001	834		FOD10=JTD(J)	00008340
003004	835		JTSIZE=1	00008350
003006	836		IF (FOD10 .GT. 6) JTSIZE=2	00008360
003013	837		IF (FOD10 .GT. 8) JTSIZE=3	00008370
003020	838		IF (FOD10 .GT. 11) JTSIZE=4	00008380
003025	839		IF (FOD10 .GT. 13) JTSIZE=5	00008390
003032	840		IF (FOD10 .GT. 16) JTSIZE=6	00008400
003037	841		IF (FOD10 .GT. 22) JTSIZE=7	00008410
003044	842		IF (FOD10 .GT. 27) JTSIZE=8	00008420
003051	843		IF (FOD10 .GT. 32) JTSIZE=9	00008430
003056	844		IF (FOD10 .GT. 37) JTSIZE=10	00008440
003063	845		IF (FOD10 .GT. 42) JTSIZE=11	00008450
003070	846		IF (FOD10 .GT. 46) JTSIZE=12	00008460
003075	847		IF (FOD10 .GT. 52) JTSIZE=13	00008470
003102	848		IF (FOD10 .GT. 62) JTSIZE=14	00008480
003107	849		IF (FOD10 .GT. 72) JTSIZE=15	00008490
003114	850		IF (FOD10 .GT. 82) JTSIZE=16	00008500
003121	851		IF (FOD10 .GT. 92) JTSIZE=17	00008510
003126	852		IF (FOD10 .GT. 102) JTSIZE=18	00008520
003133	853		IF (FOD10 .GT. 122) JTSIZE=19	00008530
003140	854		IF (FOD10 .GT. 142) JTSIZE=20	00008540
003145	855		IF (FOD10 .GT. 162) JTSIZE=21	00008550
003152	856		IF (FOD10 .GT. 182) JTSIZE=22	00008560
003157	857		IF (FOD10 .GT. 202) JTSIZE=23	00008570
003162	858	C		00008580
003164	859		2320 CONTINUE	00008590
003164	860	C		00008600
003164	861	C	A SHOP JOINT ON THIS PIECE HAS BEEN FOUND.	00008610
003164	862	C	TESTS MUST BE MADE FOR WHETHER 1ST OR LATER	00008620
003164	863	C	OCCURANCE OF EACH KIND OF JOINT TYPE (EXCEPT BOSSES).	00008630
003164	864	C	THESE ARE DONE USING FLG1, CUSW1, CMVJT1, ETC.	00008640
003164	865	C		00008650
003164	866		FABNJT=FABN(J,6)	00008660
003165	867	C		00008670
003165	868	C	MAKE SURE THE JOINT TYPE IS NOT BLANK.	00008680
003165	869	C	GET JOINT TYPE FROM DUPLICATE POINT IF IT IS.	00008690
003174	870		IF (SJTDUP(J) .EQ. 9999) GO TO 2332	00008700
003201	871		IF (SJTDUP(J) .LT. 1) GO TO 2332	00008710
003205	872	C		00008720
003206	873		IF (KOMPCH(FABNJT,1,' ',1,4) .NE. 0) GO TO 2331	00008730
003217	874	C		00008740
003220	875		IF (KOMPCH(FABN(SJTDUP(J),6),1,' ',1,4) .EQ. 0) GO TO 2331	00008750
003234	876	C		00008760
003235	877		FABNJT=FABN(SJTDUP(J),6)	00008770
003235	878	C		00008780
003247	879		2331 CONTINUE	00008790
003247	880	C	BLANK OUT DUPLICATE JOINT	00008800
003247	881		SHOPJT(SJTDUP(J))=0	00008810
003252	882	C		00008820
003253	883		2332 CONTINUE	00008830
003253	884	C		00008840
003253	885		TEST FOR FLANGE	00008850

002522	768	1388	FTOTAL=FTOTAL+FABHRS(BRZFLG,FFSIZE)	00007680
002526	769	C		00007690
002531	770	1389	CONTINUE	00007700
002531	771	C		00007710
002531	772	C	ARRAY NFAB TELLS NO. OF LINES PER FITTING.	00007720
002536	773	1390	IND=IND+NFAB(K)	00007730
002536	774	C		00007740
002541	775	1395	CONTINUE	00007750
002541	776	C		00007760
002541	777	C		00007770
002541	778	C		00007780
002541	779	C		00007790
002541	780	C		00007800
002541	781	C		00007810
002541	782	C		00007820
002541	783	C	***** WELDING *****	00007830
002541	784	C		00007840
002546	785	2000	IND=1	00007850
002550	786		FLGI=0	00007860
002550	787	C		00007870
002552	788		IWSIZE=1	00007880
002554	789		IF (OD10 .GT. 6) IWSIZE=2	00007890
002561	790		IF (OD10 .GT. 8) IWSIZE=3	00007900
002566	791		IF (OD10 .GT. 11) IWSIZE=4	00007910
002573	792		IF (OD10 .GT. 13) IWSIZE=5	00007920
002600	793		IF (OD10 .GT. 16) IWSIZE=6	00007930
002605	794		IF (OD10 .GT. 22) IWSIZE=7	00007940
002612	795		IF (OD10 .GT. 27) IWSIZE=8	00007950
002617	796		IF (OD10 .GT. 32) IWSIZE=9	00007960
002624	797		IF (OD10 .GT. 37) IWSIZE=10	00007970
002631	798		IF (OD10 .GT. 42) IWSIZE=11	00007980
002636	799		IF (OD10 .GT. 46) IWSIZE=12	00007990
002643	800		IF (OD10 .GT. 52) IWSIZE=13	00008000
002650	801		IF (OD10 .GT. 62) IWSIZE=14	00008010
002655	802		IF (OD10 .GT. 72) IWSIZE=15	00008020
002662	803		IF (OD10 .GT. 82) IWSIZE=16	00008030
002667	804		IF (OD10 .GT. 92) IWSIZE=17	00008040
002674	805		IF (OD10 .GT. 102) IWSIZE=18	00008050
002701	806		IF (OD10 .GT. 122) IWSIZE=19	00008060
002706	807		IF (OD10 .GT. 142) IWSIZE=20	00008070
002713	808		IF (OD10 .GT. 162) IWSIZE=21	00008080
002720	809		IF (OD10 .GT. 182) IWSIZE=22	00008090
002725	810		IF (OD10 .GT. 202) IWSIZE=23	00008100
002730	811	C		00008110
002730	812	C		00008120
002730	813	C		00008130
002730	814	C	LOOP THROUGH ARRAY OF FITTINGS.	00008140
002730	815	C		00008150
002732	816		DO 2395 K=1,NF	00008160
002735	817	C	IF THIS FITTING IS STAVING, IGNORE IT AND CONTINUE.	00008170
002735	818		IF (KOMPCH(IPEC(4,K),1,'S',1,1) .EQ. 0) GO TO 2390	00008180
002750	819	C		00008190
002750	820	C	ELIMINATE ONE LINE FITTINGS.	00008200
002751	821		IF (NFAB(K) .EQ. 1) GO TO 2390	00008210
002755	822	C		00008220
002755	823	C		00008230
002755	824	C	SEE IF ANY JOINTS THIS PIECE	00008240
002756	825		INDEND=IND+NFAB(K)-1	00008250
002763	826		DO 2385 J=IND,INDEND	00008260

002257	709	1315	CONTINUE	00007090
002257	710		IF (KOMPCH(TYPCOD(K),3,'S',1,1) .NE. 0) GO TO 1370	00007100
002272	711		FTOTAL=FTOTAL+FABHRS(SLPFLG,FFSIZE)	00007110
002301	712		GO TO 1380	00007120
002301	713	C		00007130
002301	714	C	SEE IF BRANCH	00007140
002302	715	1320	CONTINUE	00007150
002302	716		IF (KOMPCH(TYPCOD(K),1,'P',1,1) .NE. 0) GO TO 1340	00007160
002314	717	C		00007170
002314	718	C	SEE IF EITHER ENDPT IS ON THE MAIN PIPE	00007180
002315	719		IF (SHOPJT(IND).EQ.2 .AND. SJTDUP(IND).EQ.9999) GO TO 1330	00007190
002325	720		IF (SHOPJT(IND+1).EQ.2 .AND. SJTDUP(IND+1).EQ.9999) GO TO 1330	00007200
002335	721		GO TO 1370	00007210
002335	722	C		00007220
002336	723	1330	CONTINUE	00007230
002336	724		FTOTAL=FTOTAL+FABHRS(BRANCH,FFSIZE)	00007240
002345	725		GO TO 1390	00007250
002345	726	C		00007260
002345	727	C	SEE IF BOSS	00007270
002346	728	1340	CONTINUE	00007280
002346	729		IF (KOMPCH(TYPCOD(K),1,'B',1,1) .NE. 0) GO TO 1350	00007290
002361	730		FTOTAL=FTOTAL+FABHRS(BOSS,FFSIZE)	00007300
002370	731		GO TO 1380	00007310
002370	732	C		00007320
002370	733	C	SEE IF WELDOLET	00007330
002371	734	1350	CONTINUE	00007340
002371	735		IF (KOMPCH(TYPCOD(K),1,'W',1,1) .NE. 0) GO TO 1360	00007350
002404	736		FTOTAL=FTOTAL+FABHRS(WELDO,FFSIZE)	00007360
002413	737		GO TO 1380	00007370
002413	738	C		00007380
002413	739	C	SEE IF SLEEVE	00007390
002414	740	1360	CONTINUE	00007400
002414	741		IF (KOMPCH(TYPCOD(K),1,'S',1,1) .NE. 0) GO TO 1370	00007410
002427	742		FTOTAL=FTOTAL+FABHRS(SLEEVE,FFSIZE)	00007420
002436	743		GO TO 1380	00007430
002436	744	C		00007440
002436	745	C	THEN THIS MUST BE A STD NAVY FITTING	00007450
002437	746	1370	CONTINUE	00007460
002437	747		FTOTAL=FTOTAL+FABHRS(NAVFTG,FFSIZE)	00007470
002443	748	C		00007480
002443	749	C	SEE IF BRAZED	00007490
002446	750	1380	CONTINUE	00007500
002446	751	C	SEE IF ANY JOINTS THIS PIECE	00007510
002446	752		INDEND=IND+NFAB(K)-1	00007520
002453	753		DO 1389 J=IND,INDEND	00007530
002455	754		IF (SHOPJT(J) .LT. 2) GO TO 1389	00007540
002461	755	C		00007550
002461	756	C	A SHOP JOINT ON THIS PIECE HAS BEEN FOUND	00007560
002462	757		IF (KOMPCH(FABN(J,6),1,'B',1,1) .NE. 0) GO TO 1389	00007570
002475	758		SHOPJT(J)=0	00007580
002475	759	C		00007590
002475	760	C	A BRAZED JOINT HAS BEEN FOUND, SEE IF FLANGE.	00007600
002477	761		IF (KOMPCH(TYPCOD(K),1,'F',1,1) .EQ. 0) GO TO 1388	00007610
002511	762	C		00007620
002511	763	C	A NORMAL BRAZED FITTING HAS BEEN FOUND	00007630
002512	764		FTOTAL=FTOTAL+FABHRS(BRZFIT,FFSIZE)	00007640
002521	765		GO TO 1389	00007650
002521	766	C		00007660
002521	767	C	A NORMAL BRAZED FLANGE HAS BEEN FOUND	00007670

J2027	650	C	ADD IN JOB SET-UP TIME FIRST	00006500
J2031	651		FTOTAL=FABHRS(SETUP,MPSIZE)	00006510
J2035	652	C		00006520
J2035	653	C	ADD IN ANY TIME REQUIRED FOR TEMPLATE FROM SHIP	00006530
J2037	654		IF (HRTEMP .EQ. 'T') FTOTAL=FTOTAL+FABHRS(TEMPL,MPSIZE)	00006540
J2053	655	C		00006550
J2053	656	C		00006560
J2053	657	C		00006570
J2053	658	C		00006580
J2053	659	C	LOOP THROUGH ARRAY OF FITTINGS.	00006590
J2053	660	C		00006600
J2056	661		DO 1395 K=1,NF	00006610
J2061	662	C	IF THIS FITTING IS STAVING, IGNORE IT AND CONTINUE	00006620
J2061	663		IF (KOMPCH(IPEC(4,K),1,'S',1,1) .EQ. 0) GO TO 1390	00006630
J2074	664	C		00006640
J2074	665	C	ELIMINATE ONE LINE FITTINGS	00006650
J2075	666		IF (NFAB(K) .EQ. 1) GO TO 1390	00006660
J2101	667	C		00006670
J2102	668		FFSIZE=MPSIZE	00006680
J2104	669		IF (FITSAM(K)) GO TO 1305	00006690
J2107	670	C		00006700
J2110	671		FOD10=FITCD(K)	00006710
J2113	672		FFSIZE=1	00006720
J2115	673		IF (FOD10 .GT. 32) FFSIZE=2	00006730
J2122	674		IF (FOD10 .GT. 52) FFSIZE=3	00006740
J2127	675		IF (FOD10 .GT. 82) FFSIZE=4	00006750
J2134	676		IF (FOD10 .GT. 122) FFSIZE=5	00006760
J2141	677		IF (FOD10 .GT. 162) FFSIZE=6	00006770
J2146	678		IF (FOD10 .GT. 202) FFSIZE=7	00006780
J2151	679	C		00006790
J2153	680		1305 CONTINUE	00006800
J2153	681	C	IS THIS A SPECIFIED SPECIAL FITTING?	00006810
J2153	682	C		00006820
J2153	683	C	FIRST TEST FOR SLIP-ON FLANGE	00006830
J2153	684		IF (KOMPCH(TYPCOD(K),1,'F',1,1) .NE. 0) GO TO 1320	00006840
J2165	685	C		00006850
J2165	686	C	SEE IF THIS IS A FLANGE TO FLANGE (BOLTED).	00006860
J2165	687	C	TEST IS DONE BY CHECKING IF THE CENTER OF THE FLANGE HAS	00006870
J2165	688	C	A POINT IT MATCHES TO ON THIS SAME DETAIL.	00006880
J2166	689		INDCEN=IND	00006890
J2170	690		IF (KOMPCH(FABN(INDCEN,4),1,'C',1,1) .EQ. 0) GO TO 1310	00006900
J2202	691	C		00006910
J2203	692		INDCEN=IND+1	00006920
J2206	693		IF (KOMPCH(FABN(INDCEN,4),1,'C',1,1) .EQ. 0) GO TO 1310	00006930
J2220	694	C		00006940
J2220	695	C	NO CENTER FOUND FOR THIS FLANGE?????	00006950
J2221	696		GO TO 1315	00006960
J2221	697	C		00006970
J2222	698		1310 IF (SHOPJT(INDCEN) .LT. 1) GO TO 1315	00006980
J2227	699		FTOTAL=FTOTAL+FABHRS(FLGFLG,FFSIZE)	00006990
J2233	700	C		00007000
J2233	701	C	RESET SO MATCHING FLANGE WON'T BE COUNTED	00007010
J2233	702	C	AS WELL.	00007020
J2236	703		SHOPJT(INDCEN)=0	00007030
J2240	704		IF(SJTDUP(INDCEN) .GT. 125) GO TO 1390	00007040
J2245	705		IF(SJTDUP(INDCEN) .LT. 1) GO TO 1390	00007050
J2252	706		SHOPJT(SJTDUP(INDCEN))=0	00007060
J2256	707		GO TO 1390	00007070
J2256	708	C		00007080

01633	591	C		00005910
01635	592		DO 1078 K=1,NF	00005920
01637	593	C	IF THIS FITTING IS STAVING, IGNORE IT AND CONTINUE	00005930
01637	594		IF (KOMPCH(IPEC(4,K),1,'S',1,1) .EQ. 0) GO TO 1076	00005940
01652	595	C		00005950
01652	596	C	ELIMINATE ONE LINE FITTINGS	00005960
01653	597		IF (NFAB(K) .EQ. 1) GO TO 1076	00005970
01657	598	C		00005980
01660	599		IF (KOMPCH(TYPCOD(K),4,'R',1,1) .NE. 0) GO TO 1076	00005990
01672	600	C		00006000
01673	601		INDEND=IND+NFAB(K)-1	00006010
01700	602		DO 1074 J=IND,INDEND	00006020
01703	603		IF (SHOPJT(J) .LT. 1) GO TO 1074	00006030
01707	604	C		00006040
01710	605		IF (SJTDUP(J) .GT. 125) GO TO 1072	00006050
01715	606		IF (SJTDUP(J) .LT. 1) GO TO 1074	00006060
01721	607	C		00006070
01722	608		IARG=JTFIT(SJTDUP(J))	00006080
01727	609		I=FITOD(IARG)	00006090
01732	610		IF (I .GE. FITOD(K)) GO TO 1074	00006100
01735	611	C		00006110
01736	612		FITOD(K)=I	00006120
01741	613		FITSAM(K)=FITSAM(IARG)	00006130
01745	614		GO TO 1074	00006140
01745	615	C		00006150
01746	616	1072	CONTINUE	00006160
01746	617		FITOD(K)=OD10	00006170
01751	618		FITSAM(K)=.T.	00006180
01751	619	C		00006190
01753	620	1074	CONTINUE	00006200
01753	621	C		00006210
01753	622	C		00006220
01753	623	C	ARRAY NFAB TELLS NO. OF LINES PER FITTING.	00006230
01760	624	1076	IND=IND+NFAB(K)	00006240
01760	625	C		00006250
01763	626	1078	CONTINUE	00006260
01763	627	C		00006270
01763	628	C		00006280
01763	629	C		00006290
01763	630	C		00006300
01763	631	C		00006310
01763	632	C	***** FABRICATION *****	00006320
01763	633	C		00006330
01763	634	C		00006340
01763	635	C		00006350
01763	636	C		00006360
01763	637	C		00006370
01770	638		IND=1	00006380
01770	639	C		00006390
01772	640	1300	CONTINUE	00006400
01772	641	C	MPSIZE IS MAIN PIECE SIZE CATAGORY (LINE IN ARRAY)	00006410
01772	642		MPSIZE=1	00006420
01773	643		IF (OD10 .GT. 32) MPSIZE=2	00006430
02000	644		IF (OD10 .GT. 52) MPSIZE=3	00006440
02005	645		IF (OD10 .GT. 82) MPSIZE=4	00006450
02012	646		IF (OD10 .GT. 122) MPSIZE=5	00006460
02017	647		IF (OD10 .GT. 162) MPSIZE=6	00006470
02024	648		IF (OD10 .GT. 202) MPSIZE=7	00006480
027	649			00006490

001421	532	C	THIS IS A MAJOR JOINT. COMPARE THE SIZES OF	00005320
001421	533	C	THE 2 FITTINGS AT THE JOINT, BUT TRANSFER IF	00005330
001421	534	C	THE SPECIAL CASE OF THE MAIN PIPE JOINT.	00005340
001422	535		IF (SJTDUP(J) .GT. 125) GO TO 1041	00005350
001427	536		IF (SJTDUP(J) .LT. 1) GO TO 1045	00005360
001433	537	C		00005370
001434	538		JTOD(J)=FITOD(K)	00005380
001440	539		JTSAME(J)=FITSAM(K)	00005390
001441	540	C		00005400
001444	541		IARG=JTFIT(SJTDUP(J))	00005410
001451	542		I=FITOD(IARG)	00005420
001454	543		IF (I .GE. FITOD(K)) GO TO 1045	00005430
001457	544	C		00005440
001460	545		SHOPJT(J)=1	00005450
001463	546		SHOPJT(SJTDUP(J))=2	00005460
001470	547		JTOD(J)=1	00005470
001473	548		JTSAME(J)=FITSAM(IARG)	00005480
001477	549		JTOD(SJTDUP(J))=1	00005490
001504	550		JTSAME(SJTDUP(J))=FITSAM(IARG)	00005500
001507	551	C		00005510
001507	552	C	SET FOURTH LETTER OF THE TYPE CODE TO 'R' (REDUCING)	00005520
001512	553		CALL CONCAT(TYPCOD(K),4,'R',1,1)	00005530
001512	554	C		00005540
001523	555		GO TO 1045	00005550
001523	556	C		00005560
001524	557	1041	CONTINUE	00005570
001524	558	C	NOW SET OTHER END OF THE PIECE TO BE THE MINOR JOINT	00005580
001524	559		IF(KOMPCH(TYPCOD(K),1,'S',1,1) .EQ. 0) GO TO 1044	00005590
001537	560		DO 1043 JJ=IND,INDEND	00005600
001541	561		IF (JJ .EQ. J) GO TO 1043	00005610
001544	562		IF (SHOPJT(JJ) .NE. 2) GO TO 1043	00005620
001551	563		SHOPJT(JJ)=1	00005630
001554	564		IF (SJTDUP(JJ) .GT. 125) GO TO 1043	00005640
001561	565		IF (SJTDUP(JJ) .LT. 1) GO TO 1043	00005650
001566	566		SHOPJT(SJTDUP(JJ))=2	00005660
001573	567	1043	CONTINUE	00005670
001573	568	C		00005680
001573	569	C	SET FOURTH LETTER OF THE TYPE CODE TO 'R' (REDUCING)	00005690
001600	570		CALL CONCAT(TYPCOD(K),4,'R',1,1)	00005700
001600	571	C		00005710
001611	572	1044	CONTINUE	00005720
001611	573		JTOD(J)=0D10	00005730
001614	574		JTSAME(J)=.T.	00005740
001614	575	C		00005750
001616	576	1045	CONTINUE	00005760
001616	577	C		00005770
001616	578	C		00005780
001616	579	C	ARRAY NFAB TELLS NO. OF LINES PER FITTING.	00005790
001623	580	1060	IND=IND+NFAB(K)	00005800
001626	581	1065	CONTINUE	00005810
001626	582	C		00005820
001626	583	C		00005830
001626	584	C		00005840
001626	585	C		00005850
001626	586	C		00005860
001633	587		IND=1	00005870
001633	588	C		00005880
001633	589	C	MAKE SURE FITTING INFORMATION IS IN ORDER AND READY	00005890
001633	590	C	FOR FAB. & WELDING---LOOP THROUGH ARRAY OF FITTINGS.	00005900

001176	473		JTOD(INDEND)=FITOD(K)	00004730
001202	474		JTSAME(INDEND)=FITSAM(K)	00004740
001206	475		JTOD(INDCEN)=FITOD(K)	00004750
001212	476		JTSAME(INDCEN)=FITSAM(K)	00004760
001213	477	C		00004770
001216	478		IF (KOMPCH(FABN(INDEND,4),1,'E',1,1),EQ,0) GO TO 1022	00004780
001230	479	C		00004790
001231	480		INDEND=IND+1	00004800
001234	481		INDCEN=IND	00004810
001236	482		IF (KOMPCH(FABN(INDEND,4),1,'E',1,1),EQ,0) GO TO 1022	00004820
001250	483	C		00004830
001250	484	C	NO END FOUND FOR THIS BOSS/WELDOLET?????	00004840
001251	485		GO TO 1060	00004850
001251	486	C		00004860
001252	487		1022 IF (SHOPJT(INDEND) .GT. 1) GO TO 1025	00004870
001256	488	C		00004880
001256	489	C	SET END TO MAJOR JOINT & RESET MATCHING JOINT TO MINOR	00004890
001257	490		SHOPJT(INDEND)=2	00004900
001262	491		IF(SJTODUP(INDEND) .GT. 125) GO TO 1025	00004910
001267	492		IF(SJTODUP(INDEND) .LT. 1) GO TO 1025	00004920
001274	493		SHOPJT(SJTODUP(INDEND))=1	00004930
001274	494	C		00004940
001301	495		1025 IF (SHOPJT(INDCEN) .LT. 2) GO TO 1060	00004950
001305	496	C		00004960
001305	497	C	SET CENTER TO MINOR JOINT & RESET MATCHING JOINT TO MAJOR	00004970
001306	498		IF(SJTODUP(INDCEN) .GT. 125) GO TO 1060	00004980
001313	499		IF(SJTODUP(INDCEN) .LT. 1) GO TO 1060	00004990
001320	500		SHOPJT(INDCEN)=1	00005000
001323	501		SHOPJT(SJTODUP(INDCEN))=2	00005010
001330	502		GO TO 1060	00005020
001330	503	C		00005030
001330	504	C	SEE IF BRANCH	00005040
001331	505		1029 CONTINUE	00005050
001331	506		IF (KOMPCH(TYPCOD(K),1,'P',1,1),NE,0) GO TO 1038	00005060
001343	507	C		00005070
001343	508	C	SEE IF EITHER ENDPT IS ON THE MAIN PIPE	00005080
001344	509		IF (SHOPJT(IND).EQ.2 .AND. SJTODUP(IND).EQ.9999) GO TO 1034	00005090
001354	510		IF (SHOPJT(IND+1).EQ.2 .AND. SJTODUP(IND+1).EQ.9999) GO TO 1034	00005100
001364	511		GO TO 1038	00005110
001364	512	C		00005120
001365	513		1034 CONTINUE	00005130
001365	514		JTOD(IND)=FITOD(K)	00005140
001371	515		JTSAME(IND)=FITSAM(K)	00005150
001375	516		JTOD(IND+1)=FITOD(K)	00005160
001401	517		JTSAME(IND+1)=FITSAM(K)	00005170
001405	518		GO TO 1060	00005180
001405	519	C		00005190
001406	520		1038 CONTINUE	00005200
001406	521	C		00005210
001406	522	C	LOOP THROUGH ARRAY OF FITTINGS AND DETERMINE WHICH JOINTS	00005220
001406	523	C	ARE REDUCING. HAVE THE SMALLER OF THE TWO FITTINGS	00005230
001406	524	C	BE THE ONE WHERE THE JOINT IS FLAGGED AS THE MAJOR	00005240
001406	525	C	JOINT (SHOPJT=2).	00005250
001406	526	C		00005260
001406	527	C	SEE IF ANY JOINTS THIS PIECE	00005270
001406	528		INDEND=IND+NFAB(K)-1	00005280
001413	529		DO 1045 J=IND,INDEND	00005290
001415	530		IF (SHOPJT(J) .LT. 1) GO TO 1045	00005300
001421	531			00005310

000756	414	C	ELIMINATE ONE LINE FITTINGS	00004140
000757	415		IF (NFAB(K) .EQ. 1) GO TO 1060	00004150
000763	416	C		00004160
000763	417	C	IS THIS A SPECIFIED SPECIAL FITTING?	00004170
000763	418	C		00004180
000763	419	C	FIRST TEST FOR FLANGE	00004190
000764	420		IF (KOMPCH(TYPCOD(K),1,'F',1,1) .NE. 0) GO TO 1019	00004200
000776	421	C		00004210
000776	422	C	TEST IS DONE BY CHECKING IF THE END OF THE FLANGE HAS	00004220
000776	423	C	A POINT IT MATCHES TO ON THIS SAME DETAIL.	00004230
000777	424		INDEND=IND	00004240
001001	425		INDCEN=IND+1	00004250
001004	426		IF (KOMPCH(FABN(INDEND,4),1,'E',1,1) .EQ. 0) GO TO 1012	00004260
001016	427	C		00004270
001017	428		INDEND=IND+1	00004280
001022	429		INDCEN=IND	00004290
001024	430		IF (KOMPCH(FABN(INDEND,4),1,'E',1,1) .EQ. 0) GO TO 1012	00004300
001036	431	C		00004310
001036	432	C	NO END FOUND FOR THIS FLANGE?????	00004320
001037	433		GO TO 1038	00004330
001037	434	C		00004340
001040	435		1012 IF (SHOPJT(INDEND) .GT. 1) GO TO 1014	00004350
001044	436	C		00004360
001044	437	C	SET END TO MAJOR JOINT & RESET MATCHING JOINT TO MINOR	00004370
001045	438		SHOPJT(INDEND)=2	00004380
001050	439		IF(SJTDUP(INDEND) .GT. 125) GO TO 1018	00004390
001055	440		IF(SJTDUP(INDEND) .LT. 1) GO TO 1016	00004400
001062	441		SHOPJT(SJTDUP(INDEND))=1	00004410
001067	442		GO TO 1015	00004420
001067	443	C		00004430
001070	444		1014 CONTINUE	00004440
001070	445		IF(SJTDUP(INDEND) .GT. 125) GO TO 1016	00004450
001075	446		IF(SJTDUP(INDEND) .LT. 1) GO TO 1018	00004460
001101	447	C		00004470
001102	448		1015 CONTINUE	00004480
001102	449		IARG=JTFIT(SJTDUP(INDEND))	00004490
001107	450		JTOD(INDEND)=FITOD(IARG)	00004500
001113	451		JTSAME(INDEND)=FITSAM(IARG)	00004510
001117	452		FITOD(K)=FITOD(IARG)	00004520
001123	453		FITSAM(K)=FITSAM(IARG)	00004530
001127	454		GO TO 1060	00004540
001127	455	C		00004550
001130	456		1016 CONTINUE	00004560
001130	457		FITOD(K)=CD10	00004570
001133	458		FITSAM(K)=.T.	00004580
001135	459		JTOD(INDEND)=CD10	00004590
001140	460		JTSAME(INDEND)=.T.	00004600
001142	461		GO TO 1060	00004610
001142	462	C		00004620
001143	463		1019 CONTINUE	00004630
001143	464	C	NEXT TEST FOR BOSS	00004640
001143	465		IF (KOMPCH(TYPCOD(K),1,'W',1,1) .EQ. 0) GO TO 1020	00004650
001156	466		IF (KOMPCH(TYPCOD(K),1,'B',1,1) .NE. 0) GO TO 1029	00004660
001170	467	C		00004670
001170	468	C	TEST IS DONE BY CHECKING IF THE END OF THE BOSS HAS	00004680
001170	469	C	A POINT IT MATCHES TO ON THIS SAME DETAIL.	00004690
001171	470		1020 INDEND=IND	00004700
001173	471		INDCEN=IND+1	00004710
001173	472	C		00004720

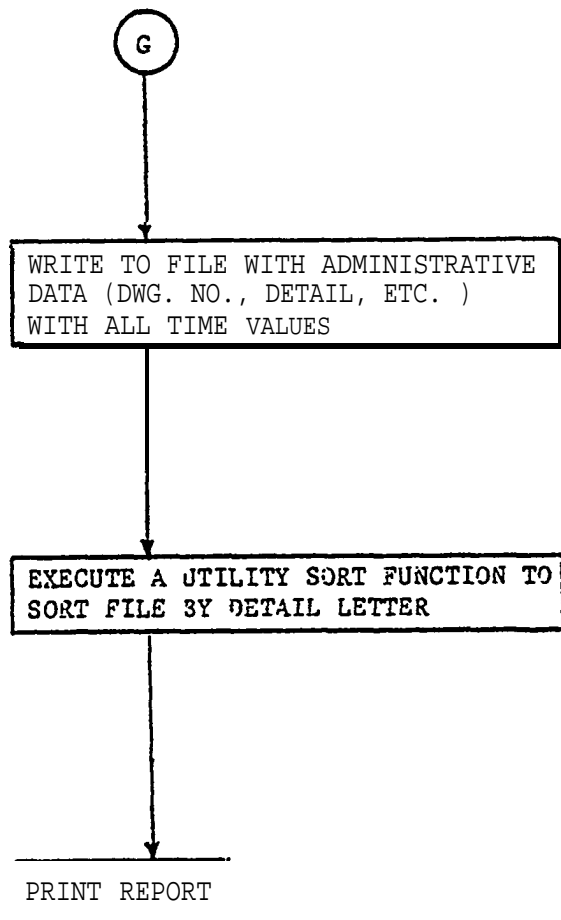
000505	355	C	A SHOP JOINT ON THIS PIECE HAS BEEN FOUND.	00003550
000506	356		FABNJT=FABN(J,6)	00003560
000507	357	C		00003570
000507	358	C	MAKE SURE THE JOINT TYPE IS NOT BLANK.	00003580
000507	359	C	GET JOINT TYPE FROM DUPLICATE POINT IF IT IS.	00003590
000516	360		IF (KOMPCH(FABNJT,1,'',1,4).NE.0) GO TO 1001	00003600
000527	361	C		00003610
000530	362		IF (SJTDUP(J).EQ.9999) GO TO 1001	00003620
000535	363		IF (SJTDUP(J).LT.1) GO TO 1001	00003630
000541	364	C		00003640
000542	365		IF (KOMPCH(FABN(SJTDUP(J),6),1,'',1,4).EQ.0) GO TO 1003	00003650
000556	366	C		00003660
000557	367		FABNJT=FABN(SJTDUP(J),6)	00003670
000557	368	C		00003680
000557	369	C	NOW CHECK FOR ROOT WELD JOINT TYPES	00003690
000571	370	1001	CONTINUE	00003700
000571	371		IF (KOMPCH(FABNJT,1,'P61',1,3).EQ.0) GO TO 1002	00003710
000603	372		IF (KOMPCH(FABNJT,1,'P62',1,3).EQ.0) GO TO 1002	00003720
000615	373		IF (KOMPCH(FABNJT,1,'P63',1,3).EQ.0) GO TO 1002	00003730
000627	374		IF (KOMPCH(FABNJT,1,'P67',1,3).EQ.0) GO TO 1002	00003740
000641	375		IF (KOMPCH(FABNJT,1,'P68',1,3).EQ.0) GO TO 1002	00003750
000653	376		IF (KOMPCH(FABNJT,1,'P70',1,3).EQ.0) GO TO 1002	00003760
000665	377		IF (KOMPCH(FABNJT,1,'P72',1,3).EQ.0) GO TO 1002	00003770
000677	378		GO TO 1003	00003780
000677	379	C		00003790
000700	380	1002	CONTINUE	00003800
000700	381	C	SET FIRST LETTER OF THE TYPE CODE TO 'B' (BOSS)	00003810
000700	382		CALL CONCAT(TYP COD(K),1,'B',1,1)	00003820
000700	383	C		00003830
000711	384	1003	CONTINUE	00003840
000711	385	C		00003850
000716	386	1004	CONTINUE	00003860
000716	387		IF (ODFLAG.EQ.1) GO TO 1006	00003870
000721	388	C		00003880
000721	389	C	SUBROUTINE GETCOD SCANS THE DESCRIPTION & FINDS THE O.D.	00003890
000721	390	C	WHEN THE 'ODFLAG' IS 2.	00003900
000721	391	C	ALSO DETERMINE RELATION TO MAIN PIPE PIECE.	00003910
000722	392	1005	CONTINUE	00003920
000722	393		ODFLAG=2	00003930
000724	394		CALL GETCOD(JJ)	00003940
000724	395	C		00003950
000724	396	C	ARRAY NFAB TELLS NO. OF LINES PER FITTING.	00003960
000730	397	1006	IND=IND+NFAB(K)	00003970
000730	398	C		00003980
000733	399	1008	CONTINUE	00003990
000733	400	C		00004000
000733	401	C		00004010
000733	402	C		00004020
000733	403	C		00004030
000733	404	C		00004040
000740	405		IND=1	00004050
000740	406	C		00004060
000740	407	C	MAKE SURE FITTING INFORMATION IS IN ORDER AND READY	00004070
000740	408	C	FOR FAB. & WELDING---LOOP THROUGH ARRAY OF FITTINGS.	00004080
000740	409	C		00004090
000742	410		DO 1065 K=1,NF	00004100
000743	411	C	IF THIS FITTING IS STAVING, IGNORE IT AND CONTINUE	00004110
000743	412		IF (KOMPCH(IPEC(4,K),1,'S',1,1).EQ.0) GO TO 1060	00004120
000756	413	C		00004130

000277	296		IF (KOMPCH(FABN(K,6),1,'S',1,4).EQ. 0) GO TO 940	00002960
000312	297		IF (KOMPCH(FABN(K,6),1,'U',1,4).EQ. 0) GO TO 940	00002970
000325	298		SHOPJT(K)=1	00002980
000330	299		SHOPJT(J)=2	00002990
000333	300		SJTDUP(K)=J	00003000
000336	301		SJTDUP(J)=K	00003010
000341	302		GO TO 940	00003020
000342	303	920	CONTINUE	00003030
000342	304	C		00003040
000347	305	925	CONTINUE	00003050
000347	306		IF (NP.EQ. 0) GO TO 940	00003060
000352	307		DO 930 J=1,NPPPTS	00003070
000355	308		IF (IPTA.NE. IPOINT(J)) GO TO 930	00003080
000362	309		SJTDUP(K)=9999	00003090
000365	310		SHOPJT(K)=2	00003100
000370	311		GO TO 940	00003110
000371	312	930	CONTINUE	00003120
000376	313	940	CONTINUE	00003130
000376	314	C		00003140
000376	315	C		00003150
000376	316	C		00003160
000403	317		IF (NTRUEF.EQ. 0) GO TO 3000	00003170
000405	318	C		00003180
000405	319	C		00003190
000405	320	C		00003200
000406	321		IND=1	00003210
000406	322	C		00003220
000406	323	C	MAKE SURE FITTING INFORMATION IS IN ORDER AND READY	00003230
000406	324	C	FOR FAB. & WELDING---LOOP THROUGH ARRAY OF FITTINGS.	00003240
000406	325	C		00003250
000410	326		DO 1008 K=1,NF	00003260
000411	327	C	IF THIS FITTING IS STAVING, IGNORE IT AND CONTINUE	00003270
000411	328		IF (KOMPCH(IPEC(4,K),1,'S',1,1).EQ. 0) GO TO 1008	00003280
000424	329	C		00003290
000424	330	C	ELIMINATE ONE LINE FITTINGS	00003300
000425	331		IF (NFAB(K).EQ. 1) GO TO 1008	00003310
000431	332	C		00003320
000432	333		JJ=K	00003330
000434	334		ODFLAG=0	00003340
000434	335	C		00003350
000434	336	C	MAKE SURE THERE IS A TYPE CODE VALUE.	00003360
000435	337		IF (KOMPCH(TPCOD(K),1,'XXX',1,3).NE. 0) GO TO 1000	00003370
000447	338	C		00003380
000447	339	C	SUBROUTINE GETCOD SCANS THE DESCRIPTION & GUESSES A TYPE CODE	00003390
000447	340	C	WHEN THE 'ODFLAG' IS 1.	00003400
000450	341		ODFLAG=1	00003410
000452	342		CALL GETCOD(JJ)	00003420
000452	343	C		00003430
000452	344	C	SOME FITTINGS ARE NEARLY IDENTICAL TO BOSSES IN THE WAY	00003440
000452	345	C	THEY ARE WELDED ONTO THE PIPE. EXAMINE ALL MISC. FIT-	00003450
000452	346	C	TINGS CHECKING FOR ROOT WELD JOINT TYPES WHICH INDICATE	00003460
000452	347	C	THIS FITTINGS IS TO BE TREATED AS A BOSS.	00003470
000456	348		1000 CONTINUE	00003480
000456	349		IF (KOMPCH(TPCOD(K),1,'M',1,1).NE. 0) GO TO 1005	00003490
000470	350	C		00003500
000471	351		INDEND=IND+NFAB(K)-1	00003510
000476	352		DO 1003 J=IND,INDEND	00003520
000501	353		IF (SHOPJT(J).LT. J) GO TO 1003	00003530
000505	354	C		00003540

000077	237	C	SHOPJT, DIMENSIONED 125, HAS FOUR POSSIBLE INTEGER	00002370
000077	238	C	FLAGS AS VALUES. IT = -1 IF THE SAME LINE IN FABN	00002380
000077	239	C	REFERS TO A ONE LINE FITTING, =0 IF THE POINT NUMBER	00002390
000077	240	C	DOES NOT MATCH ANY OTHER POINT WITHIN THE DETAIL,	00002400
000077	241	C	AND =1 OR 2 DEPENDING ON THE OCCURANCE OF THE	00002410
000077	242	C	MATCHED POINT IN THE DETAIL.	00002420
000077	243	C		00002430
000077	244	C	SJTDUP HAS THE POSITION WITHIN ARRAY FABN THAT	00002440
000077	245	C	THE MATCHING POINT OCCURS. (IF THE POINT IS	00002450
000077	246	C	ON THE MAIN PIPE, THE VALUE GIVEN IS 9999).	00002460
000077	247	C		00002470
000077	248	C	'NTRUEF' IS THE # OF TRUE FITTINGS (NO STAVING	00002480
000077	249	C	OR ONE LINE FITTINGS).	00002490
000101	250		NTRUEF=NF	00002500
000101	251	C		00002510
000103	252		DO 895 K=1,NF	00002520
000105	253		INDEND=IND+NFAB(K)-1	00002530
000110	254	C		00002540
000110	255	C	SET UP FLAG TO SKIP ONE LINE FITTINGS	00002550
000112	256		IF (NFAB(K) .EQ. 1) GO TO 810	00002560
000117	257		IF (KOMPCH(IPEC(4,K),1,'S',1,1) .EQ. 0) GO TO 810	00002570
000134	258		GO TO 840	00002580
000134	259	C		00002590
000135	260		810 SHOPJT(IND)=-1	00002600
000140	261		NTRUEF=NTRUEF-1	00002610
000142	262		DO 830 J=IND,INDEND	00002620
000145	263		820 JTFIT(J)=25	00002630
000155	264		GO TO 890	00002640
000155	265	C		00002650
000155	266	C	SETUP ARRAY MATCHING FITTING ARGUMENT	00002660
000155	267	C	NUMBER WITH JOINT ARGUMENT NUMBER, I.E., WHICH	00002670
000155	268	C	FITTING DOES THIS JOINT APPLY TO?	00002680
000156	269		840 CONTINUE	00002690
000156	270		DO 850 J=IND,INDEND	00002700
000161	271		850 JTFIT(J)=K	00002710
000162	272	C		00002720
000171	273		830 IND=IND+NFAB(K)	00002730
000174	274		835 CONTINUE	00002740
000174	275	C		00002750
000201	276		MAXIND=IND-1	00002760
000201	277	C		00002770
000204	278		DO 940 K=1,MAXIND	00002780
000207	279	C	SKIP ONE LINE FITTINGS	00002790
000207	280		IF (SHOPJT(K) .EQ. -1) GO TO 940	00002800
000213	281	C		00002810
000213	282	C	ALSO SKIP THOSE THAT HAVE BEEN ALREADY MATCHED,	00002820
000214	283		IF (SHOPJT(K) .EQ. 2) GO TO 940	00002830
000220	284	C		00002840
000221	285		SJTDUP(K)=0	00002850
000223	286		SHOPJT(K)=0	00002860
000225	287		IPTA=IABN(K,5)	00002870
000226	288	C		00002880
000230	289		IF (K .EQ. MAXIND) GO TO 925	00002890
000234	290		DO 920 J=K+1,MAXIND	00002900
000237	291		IF (IABN(J,5) .NE. IPTA) GO TO 920	00002910
000244	292		IF (SHOPJT(J) .EQ. -1) GO TO 920	00002920
000250	293	C	JOINTS THAT ARE SCREWED OR THREADED ARE IGNORED.	00002930
000251	294		IF (KOMPCH(FABN(J,6),1,'S',1,4) .EQ. 0) GO TO 940	00002940
000264	295		IF (KOMPCH(FABN(J,6),1,'U',1,4) .EQ. 0) GO TO 940	00002950

000012	178		DATA MCHING/		00001780
000012	179	C	ARG. NO.	1 2 3 4 5	00001790
000012	180	C	0.5" THRU 1.0"		00001800
000012	181	&	1.0, 1.0, 1.0, 1.0, 1.0,		00001810
000012	182	C	1.25" THRU 4.0"		00001820
000012	183	&	1.0, 1.0, 1.0, 1.0, 1.0,		00001830
000012	184	C	5.0" THRU 8.0"		00001840
000012	185	&	1.0, 1.0, 1.0, 1.0, 1.0,		00001850
000012	186	C	10.; THRU 14.;		00001860
000012	187	&	1.0, 1.0, 1.0, 1.0, 1.0,		00001870
000012	188	C	16.; THRU 20.;		00001880
000012	189	&	1.0, 1.0, 1.0, 1.0, 1.0/		00001890
000012	190	C			00001900
000012	191	C			00001910
000012	192	C			00001920
000012	193	C	***** BENDING *****		00001930
000012	194	C			00001940
000012	195	C	DETERMINE BENDING VALUE FIRST		00001950
000012	196		IF (NP .EQ. 0) GO TO 700		00001960
000015	197		IF (NB .EQ. 0) GO TO 700		00001970
000017	198	C			00001980
000020	199		300 I=1		00001990
000022	200		IF (OD10 .GT. 38) I=2		00002000
000027	201		IF (OD10 .GT. 65) I=3		00002010
000034	202		BTOTAL=BNDHRS(NB,I)		00002020
000040	203	C			00002030
000040	204	C			00002040
000040	205	C			00002050
000040	206	C	***** SET UP ARRAYS FOR FABRICATION *****		00002060
000040	207	C			00002070
000040	208	C	DETERMINE FABRICATION VALUES		00002080
000042	209		700 CONTINUE		00002090
000042	210	C			00002100
000042	211	C			00002110
000042	212		FTOTAL=0.0		00002120
000044	213		WTOTAL=0.0		00002130
000045	214		MTOTAL=0.0		00002140
000045	215	C			00002150
000045	216	C	MPSIZE IS MAIN PIECE SIZE CATAGORY (LINE IN ARRAY)		00002160
000046	217		MPSIZE=1		00002170
000050	218		IF (QD10 .GT. 32) MPSIZE=2		00002180
000055	219		IF (QD10 .GT. 52) MPSIZE=3		00002190
000062	220		IF (QD10 .GT. 82) MPSIZE=4		00002200
000067	221		IF (QD10 .GT. 122) MPSIZE=5		00002210
000072	222	C			00002220
000074	223		IF (NF .EQ. 0) GO TO 3000		00002230
000076	224	C			00002240
000076	225	C			00002250
000076	226	C			00002260
000076	227	C	IND=INDEX INTO FABN ARRAY. ALSO NOTE, FABN(IND,4)		00002270
000076	228	C	IS THE EVENT (CENTER OR END) AND FABN(IND,5) IS THE		00002280
000076	229	C	POINT NUMBER.		00002290
000077	230		IND=1		00002300
000077	231	C			00002310
000077	232	C	DETERMINE WHICH JOINTS ARE SHOP JOINTS		00002320
000077	233	C	(THOSE WITHIN A PARTICULAR DETAIL) AS		00002330
000077	234	C	OPPOSED TO THOSE MADE ON THE SHIP (I.E., THOSE		00002340
000077	235	C	JOINTS BETWEEN DETAILS).		00002350
000077	236	C			00002360

00012	119	C 20.5" THRU ...		00001190
00012	120	& 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0/		00001200
00012	121	C		00001210
00012	122	C		00001220
00012	123	C	TIME VALUES FOR WELDING	00001230
00012	124	REAL WELDS(15,23)		00001240
00012	125	DATA WELDS/		00001250
00012	126	C ARG. NO. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		00001260
00012	127	C 0.5"		00001270
00012	128	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001280
00012	129	C 0.75"		00001290
00012	130	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001300
00012	131	C 1.0"		00001310
00012	132	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001320
00012	133	C 1.25"		00001330
00012	134	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001340
00012	135	C 1.5"		00001350
00012	136	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001360
00012	137	C 2.0"		00001370
00012	138	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001380
00012	139	C 2.5"		00001390
00012	140	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001400
00012	141	C 3.0"		00001410
00012	142	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001420
00012	143	C 3.5"		00001430
00012	144	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001440
00012	145	C 4.0"		00001450
00012	146	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001460
00012	147	C 4.5"		00001470
00012	148	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001480
00012	149	C 5.0"		00001490
00012	150	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001500
00012	151	C 6.0"		00001510
00012	152	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001520
00012	153	C 7.0"		00001530
00012	154	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001540
00012	155	C 8.0"		00001550
00012	156	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001560
00012	157	C 9.0"		00001570
00012	158	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001580
00012	159	C 10.0"		00001590
00012	160	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001600
00012	161	C 14.0"		00001610
00012	162	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001620
00012	163	C 14.0"		00001630
00012	164	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001640
00012	165	C 16.0"		00001650
00012	166	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001660
00012	167	C 18.0"		00001670
00012	168	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001680
00012	169	C 20.0"		00001690
00012	170	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,		00001700
00012	171	C 24.0"		00001710
00012	172	& 1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0/		00001720
00012	173	C		00001730
00012	174	C		00001740
00012	175	C		00001750
00012	176	C	TIME VALUES FOR MACHINING OF NON-NUC. IN NUCLEAR SHOP	00001760
00012	177	REAL MCHING(5,5)		0 " '0



000000	1	**RUN **;ONEW(BCD,NCGO,CORE=23)	00000010
000012	2	C SUB. STDTIM(TEMP,AD1,ADN)--STA25P1--CALCULATE STD. TIME VALUES	00000020
000012	3	SUBROUTINE STDTIM(TEMP,AD1,ADN)	00000030
000012	4	C	00000040
000012	5	C NF INTEGER # OF FITTINGS	00000050
000012	6	C NTRUEF INTEGER # OF FITTINGS MINUS THE EXCLUDED FITTINGS	00000060
000012	7	C NP INTEGER # OF PIPES	00000070
000012	8	C NX INTEGER # OF EXTRUSIONS	00000080
000012	9	C NB INTEGER # OF BENDS	00000090
000012	10	C NPPPTS INTEGER # OF POINTS ON THE PIPE PIECE	00000100
000012	11	C MAXIND INTEGER # OF EVENTS (ENDS PLUS CENTERS) ON THE DETAIL	00000110
000012	12	C NFAB INTEGER ARRAY-# OF POINTS THIS PIECE	00000120
000012	13	C IPEC CHAR. ARRAY-PIECE NUMBER (THE 13TH CHAR. IS 'S' IF THE	00000130
000012	14	C PIECE IS STAVING)	00000140
000012	15	C TYPCOD CHAR. ARRAY-TYPE CODE. IT IS 'XXX' IF THIS PIECE	00000150
000012	16	C IS NOT IN CAPCATS	00000160
000012	17	C OD REAL NOMINAL SIZE OF THE MAIN PIPE PIECE	00000170
000012	18	C OD10 INTEGER THE NOMINAL SIZE OF THE MAIN PIPE PIECE X 10, THEN	00000180
000012	19	C ROUNDED. (THE INTEGER VALUE IS EASIER TO WORK WITH)	00000190
000012	20	C FITOD INTEGER ARRAY-THE NOMINAL SIZE OF THE FITTING X 10, & ROUNDED	00000200
000012	21	C JTOD INTEGER ARRAY-THE NOMINAL SIZE OF THE JOINT X 10, & ROUNDED.	00000210
000012	22	C FITSAM LOGICAL TRUE IF FITTING O.D. IS SAME AS MAIN PIECE	00000220
000012	23	C FALSE OTHERWISE	00000230
000012	24	C JTSAME LOGICAL TRUE IF JOINT O.D. IS SAME AS MAIN PIECE	00000240
000012	25	C FALSE OTHERWISE	00000250
000012	26	C MPSIZE INTEGER MAIN PIECE SIZE CATAGORY (LINE IN TABLE)	00000260
000012	27	C FFSIZE INTEGER FITTING SIZE CATAGORY (LINE IN FAB. TABLE)	00000270
000012	28	C JTSIZE INTEGER FITTING SIZE CATAGORY (LINE IN WELDING TABLE)	00000280
000012	29	C MAT CHAR. ARRAY-MATERIAL CODE	00000290
000012	30	C IDES CHAR. ARRAY-DESCRIPTION	00000300
000012	31	C TEMP REAL ARRAY-EXTRA PIPE LENGTH ADDED ONTO END OF PIPE	00000310
000012	32	C HRTEMP CHAR. FLAG INDICATING WHETHER DETAIL IS 'TEMPLATE FROM SHIP	00000320
000012	33	C SHOPJT INTEGER ARRAY-FLAG TELLING TYPE OF JOINT (SEE EXPLANATION IN	00000330
000012	34	C SDUPJT INTEGER ARRAY-ARGUMENT WITHIN SHOPJT THAT THE MATCHING	00000340
000012	35	C JOINT OCCURS.	00000350
000012	36	C FLO1 INTEGER =0 IF THE FIRST FLANGE JOINT THIS DETAIL	00000360
000012	37	C CSSW1 INTEGER =0 IF THE FIRST CARBON STEEL SOCKET WELD JOINT THIS D	00000370
000012	38	C CUSW1 INTEGER =0 IF THE FIRST COPPER-NICKEL SOCKET WELD JOINT THIS	00000380
000012	39	C OMSW1 INTEGER =0 IF THE FIRST OTHER METAL SOCKET WELD JOINT THIS DE	00000390
000012	40	C CSVJT1 INTEGER =0 IF THE FIRST CARBON STEEL BUTTWELD JOINT THIS DETA	00000400
000012	41	C CUVJT1 INTEGER =0 IF THE FIRST COPPER-NICKEL BUTTWELD JOINT THIS DET	00000410
000012	42	C OMVJT1 INTEGER =0 IF THE FIRST OTHER METAL BUTTWELD JOINT THIS DETAI	00000420
000012	43	C AD1 REAL LENGTH TO BE CUT OFF END 1 OF PIPE	00000430
000012	44	C ADN REAL LENGTH TO BE CUT OFF END N OF PIPE	00000440
000012	45	C BTOTAL REAL NORMAL TIME VALUE FOR BENDING	00000450
000012	46	C FTOTAL REAL NORMAL TIME VALUE FOR FABRICATION	00000460
000012	47	C WTOTAL REAL NORMAL TIME VALUE FOR WELDING	00000470
000012	48	C MTOTAL REAL NORMAL TIME VALUE FOR MACHINING	00000480
000012	49	C	00000490
000012	50	C 'KOMPCH' IS A FUNCTION THAT COMPARES CHARACTERS.	00000500
000012	51	C IN THE EXAMPLE 'KOMPCH(A,B,C,D,E)' THE ARGUMENTS ARE VARIABLE	00000510
000012	52	C STRING 'A', STARTING IN CHARACTER 'B' OF THAT STRING;	00000520
000012	53	C VARIABLE STRING 'C', STARTING IN CHARACTER 'D' OF THAT STRING;	00000530
000012	54	C COMPARING FOR 'E' CHARACTERS.	00000540
000012	55	C THE FUNCTION EQUALS 0 IF THEY MATCH.	00000550
000012	56	C	00000560
000012	57	COMMON/FITING/ OD,NP,NX,NB,NF,MAT(25),IDES(6,25),DETAIL,	00000570
000012	58	& HULL(5),NFAB(25),IPEC(4,25),FABN(125,16),IPPOINT(25),NPPPTS,	00000580
000012	59	& REV,ORNO(4),DWGNO(5)	00000590